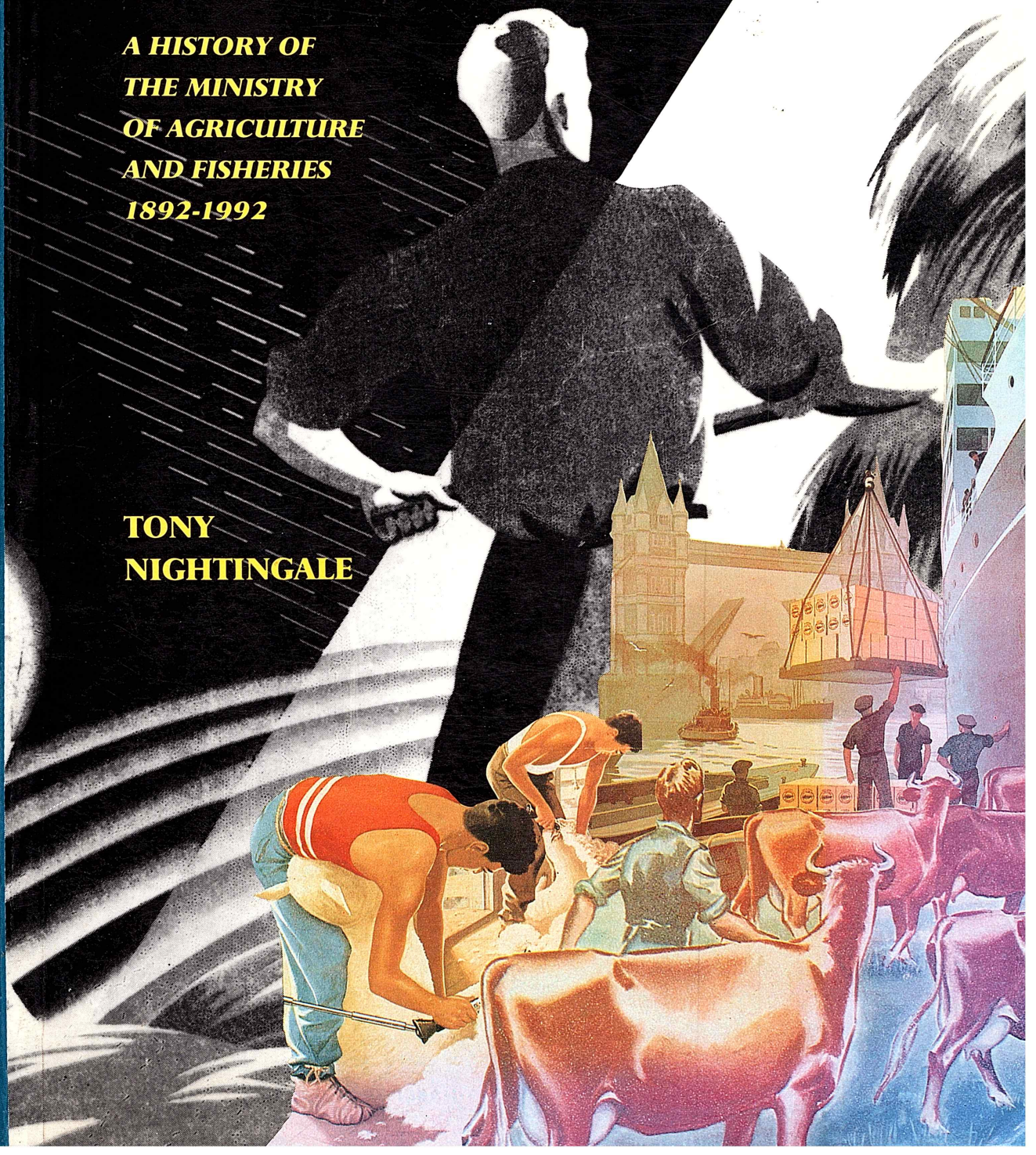
WHITE COLLARS AND GUMBOOTS

MAF

A HISTORY OF THE MINISTRY OF AGRICULTURE AND FISHERIES 1892-1992



TONY NIGHTINGALE

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A History of the Ministry of Agriculture and Fisheries, 1892-1992

Tony Nightingale
Historical Branch
Department of Internal Affairs

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Preface

The last decade has been a period of major change within the Ministry of Agriculture and Fisheries (MAF), with a move away from its traditional role as farmers' advocate, to a more detached view which places considerable importance on monitoring the efficiency of the agricultural sector as a whole. As part of this process MAF has closely examined its functions. This history examines how and why MAF's major functions emerged, from its inception as the Department of Agriculture to the present day. The emphasis on function has led to an examination of what was new and developing, i.e. why did the Department develop a new function at a particular time and how was this new function cemented in place? This book focuses on the broader aims and policies of governments, scientists, and farm advisory officers rather than the development of the bureaucracy, its internal politics and personalities. The project was begun in April 1991, and a restricted focus was required in order to do justice to this major government department. MAF and the Historical Branch of the Department of Internal Affairs have been realistic and positive in setting up this project, and their approach has been a major factor in getting this book to print.

My thanks are due to Jock Phillips and the Historical Branch for providing a unique and stimulating environment in which to work. Specific thanks must go to John E. Martin and David Green, who have worked on bringing the manuscript to publication standard. Special thanks are also due to Kathryn Hastings and Gael Ferguson.

There are many staff at MAF to whom I am indebted, particularly Robert Brewer, Royce Elliott and Barry Watson for overseeing the project. I wish to thank MAF Library staff, especially Eve Archer and Carol Devine; Mattie Wall, Jim Bell and Morgan Williams of the Rabbit and Land Management Programme; Mike Davidson on animal health; John Randall on noxious weeds; Robin Johnson, Ann Pomeroy, Sharon Cottrell and John Asquith

on policy; and, especially, Larry Paul on fisheries. I am grateful to the Visual Arts team at Ruakura, particularly Sharon Hollis, Alan Barker at Wallaceville, and Phil Stewart of Words and Pictures for all their help with locating photographs.

My thanks also go to the librarians of the Internal Affairs Library, particularly Mary-Jane Thompson, the Alexander Turnbull Library, Massey University Library and National Library, who have cheerfully helped me with enquiries. National Archives staff have also been of great assistance, especially Brent Parker.

Tony Nightingale
August 1992

Chapter 1

Origins and Formation of the Department of Agriculture

Agriculture in New Zealand

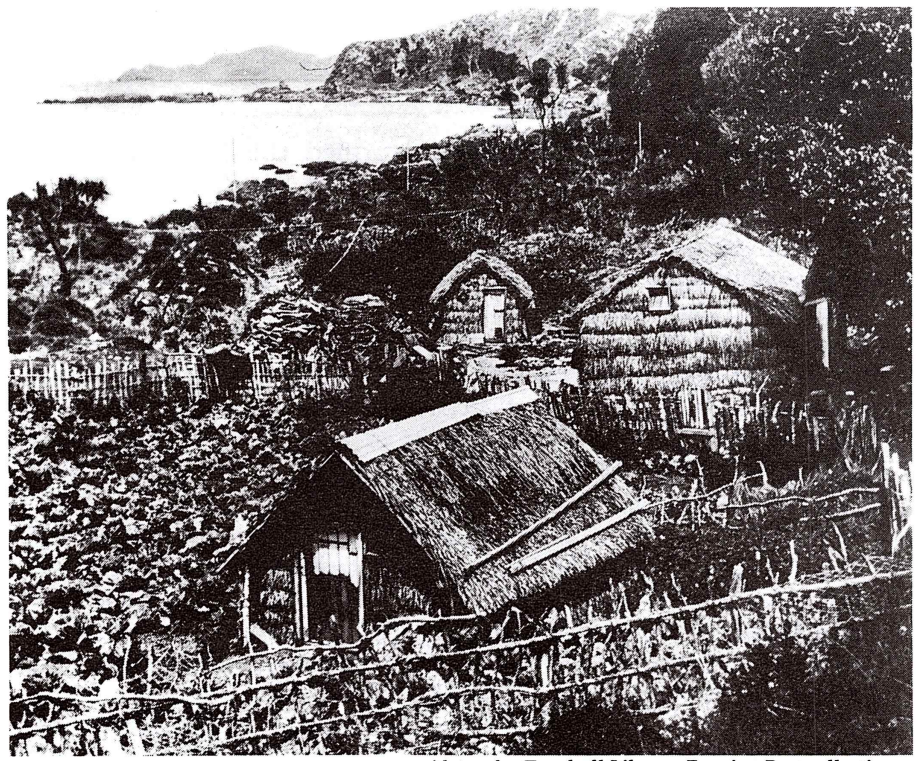
In 1892 the Liberal Government formed the Department of Agriculture by amalgamating the Stock and Agricultural Branches of the Department of Crown Lands. The creation of a specific department providing farmers with expert scientific advice to improve both the quality and quantity of production represented a significant advance in the scope of government assistance to New Zealand's farmers. The state had assisted settlers onto the land since the early years of the colony. The setting up of an agricultural department reflected an international trend. Victoria had created such a department in 1872, and by 1901 they existed in all six Australian states.[1] In the United States the first Secretary for Agriculture was appointed in 1889.

People have been cultivating the soils of New Zealand for about a thousand years, for most of that period within small self-contained units. Maori agricultural techniques were based on traditions derived from elsewhere and adapted to a new environment. The Maori introduced the kumara, taro, yam, gourd, and the paper mulberry.[2] They used fire extensively in both hunting and agriculture, and this led to considerable alteration of the environment, particularly in Canterbury where vast tussock lands were created.

Maori agricultural practices were regionally diverse. Tribes often relied on the growing of kumara, supplemented by fishing,

hunting, and the use of native trees and plants for food. Because of a colder climate some southern tribes were unable to grow kumara. Although there was some bartering of goods between groups, Maori agriculture was generally sufficient only to sustain the producers, and trade did not extend to the land itself, which was held by right of occupation and/or conquest.

By the early nineteenth century tribes on the coasts where whalers settled were supplying pork and potatoes to the visitors. With more contact the range of crops and animals available to



Alexander Turnbull Library, Evening Post collection

Maori quickly took up Pakeha crops and grew for a market created by the influx of settlers. By the 1870s, when this photograph was taken at Karaka Bay, Wellington, commercial farming had declined but was still significant.

the Maori increased considerably, but their central role in agriculture receded as settlers themselves took up farming.

The new settlers found New Zealand's climate encouragingly familiar. Situated between latitudes 34 and 47 South, the country lies in the temperate zone. The climate is dominated by the prevailing westerly winds that pick up considerable moisture from the Tasman Sea and release it over the land as rain. Year-round plant growth is possible throughout much of the country. While New Zealand's climate is similar to that of north-western Europe, it is in some respects better suited to agriculture. Many European crops and animals can be husbanded more efficiently in New Zealand.[3]

In the 1850s European immigration increased and racial tension rose considerably. In the North Island settler land hunger came up against Maori unwillingness to sell, and war broke out. The imposition of colonial authority led, in the long run, to settler political and economic dominance, but there was considerable insecurity in areas where former combatants lived side by side.

The first major type of farming for export in New Zealand was extensive pastoralism, growing wool for the British market. English woollen mills were manufacturing for the world and demanded new sources of raw material. In the early 1840s Clifford and Weld's success in the Wairarapa showed that large-scale pastoralism was viable in New Zealand. High wool prices encouraged other runholders, particularly in the South Island. Wool prices remained buoyant for several decades, only to fall dramatically in the 1880s. Much of the North Island, however, was unsuitable for pastoralism, with both dense bush-covered country and Maori land-ownership restricting access. Pastoralism flourished in the South Island, particularly in Canterbury and later in Otago and Southland.[4] Sheep numbers grew dramatically, so that by 1881 there were 13 million sheep in the colony, nine million of which were in the South Island.

The New Zealand economy boomed in the 1870s as a consequence of Julius Vogel's policy of borrowing and speculation in land. Exports of wool and wheat increased greatly. The wheat boom had major implications for agriculture. Mixed crop and animal production developed on fertile flat land in Otago and Canterbury. As a result of the increased income from exports

many leaseholders were able to freehold their land. By 1880 more than one-fifth of New Zealand had been freeholded; this included much of the best land. Much of the land that remained in Crown hands was under pastoral lease, or likely to be unsuitable for farming. Rising land prices culminated in a speculative boom in 1878. With the deterioration of the economy and the beginning of the 'Long Depression' at the end of the

Alexander Turnbull Library

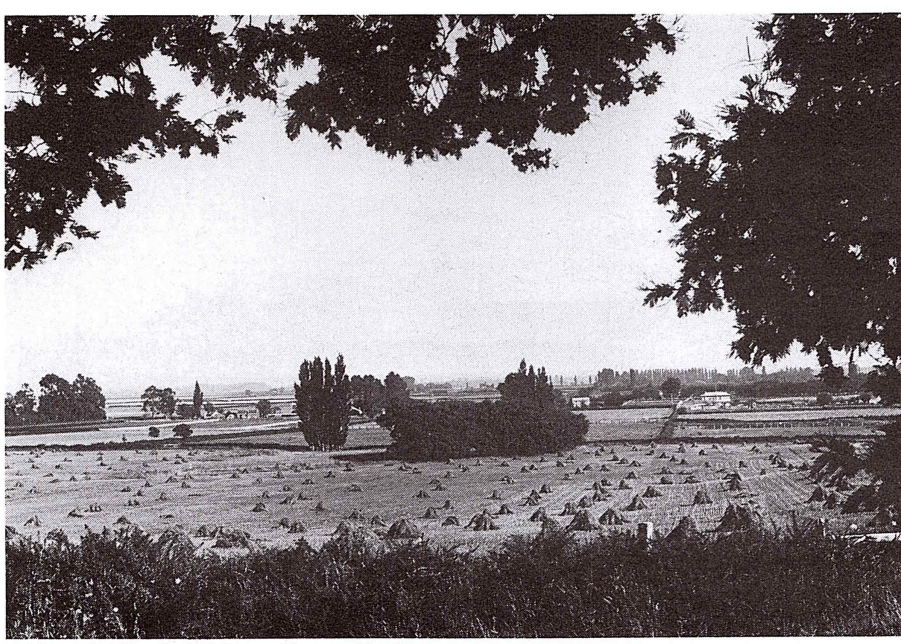
1870s, many who had bought land during the boom found that they could only sell it at a loss.

Right *Wool was exported from runs which were often in inaccessible places. In this photograph taken early this century, wool from the east coast of the North Island is rowed out to a waiting coastal steamer.*

National Archives, MAF collection

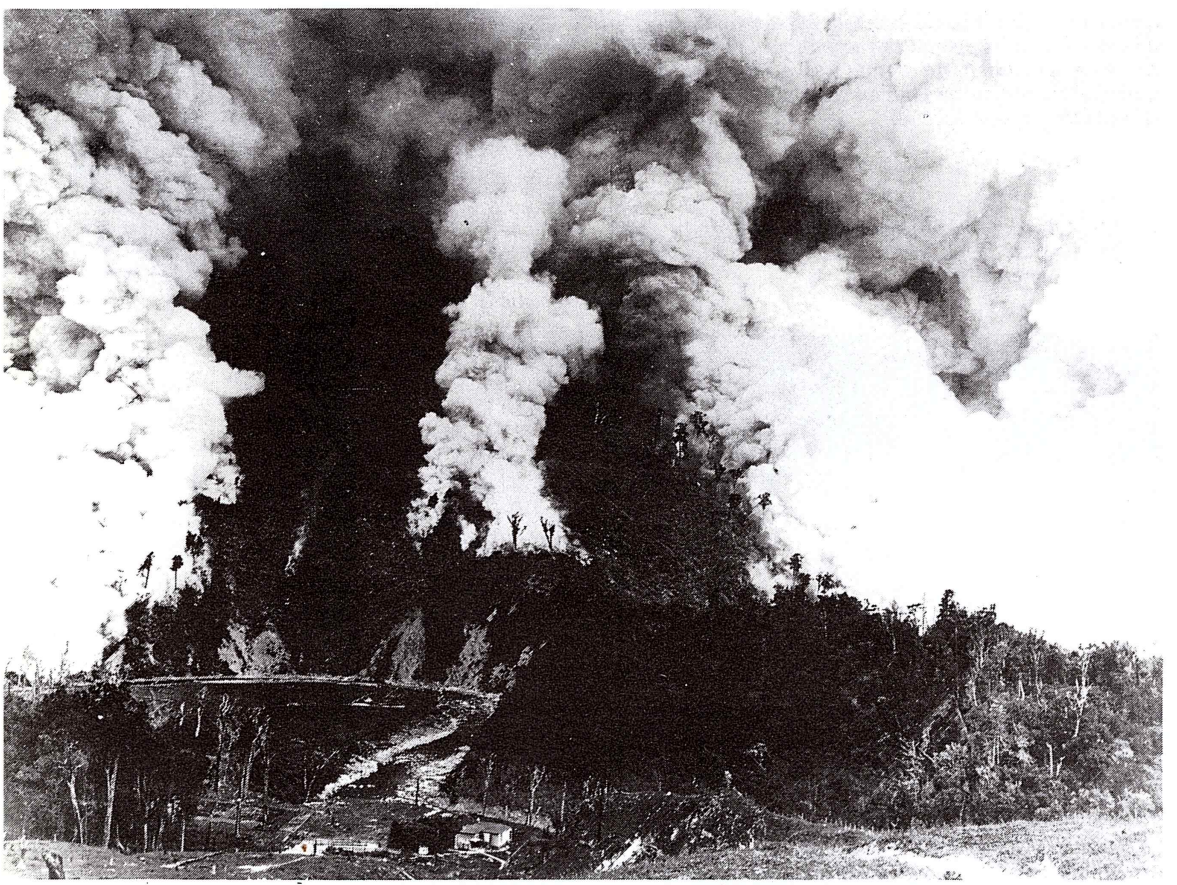
Opposite *The tussock-covered Mesopotamia run 30 miles north-west of Ashburton was typical of the land the graziers moved inland to occupy in the 1850s and 1860s. Subsequently the flatter land on the plains was grassed in high-yielding exotic species.*

Below *Otago and Canterbury dominated grain growing, but harvest fields were to be seen throughout the country, as here in Nelson.*



Alexander Turnbull Library, Tyree collection

By the 1880s farming on the east coast of the South Island had developed and diversified considerably. Extensive pastoralism was dominated by the runholders of Otago and Canterbury. Much of their land was unimproved hill country held under Crown pastoral lease. Mixed farms, growing crops – especially wheat for export – and running livestock, were to be found on the plains and lowlands. These farms were often quite large. In the



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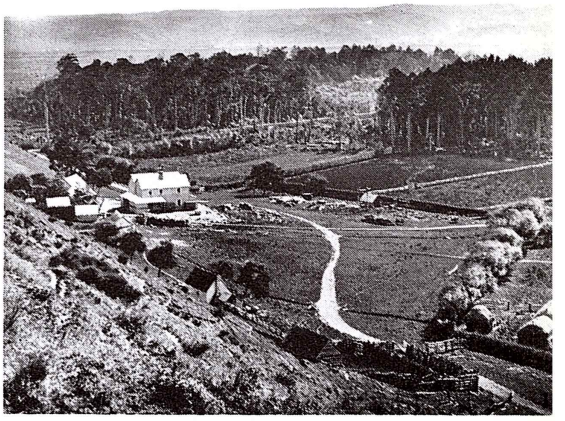
Fire was used to clear the land, particularly densely bush-clad regions of the North Island. A successful burn was vital if regeneration of bush was to be avoided.

North Island development had been much slower. Here the dominant mode was smaller-scale mixed livestock farming on land being cleared of bush or scrub.

Alexander Turnbull Library, Harding-Denton collection



These two photographs taken near Inglewood and in the Rangitikei in the late 1870s/early 1880s are typical of North Island bush in the process of being cleared.

Prior to the general use of fertilisers, expansion of production was possible largely through an increase in the area farmed. By 1890 approximately 20 million acres of land had been occupied by European settlers, much of it in the South Island. Large areas of the North Island remained in Maori hands, and the land that was available there was mostly bush-covered. The development of pasture required considerable capital at a time when prices were declining and confidence amongst producers was low.

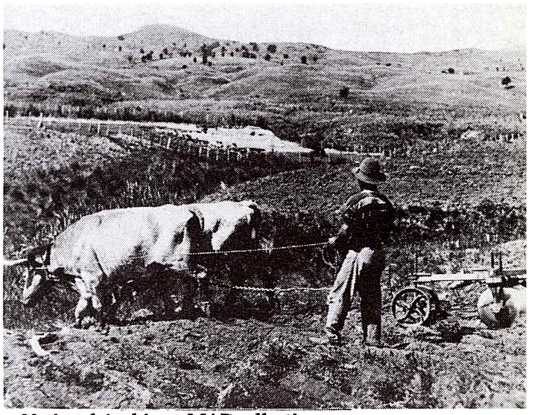
It is generally believed nowadays that production increased steadily because New Zealand had a favourable climate and good soils. While this is largely true, it ignores the detrimental effect of exploitation on the soil and downplays the role of science in farming since the late nineteenth century. Between the 1870s and the early twentieth century there was a tendency to farm at the expense of soil fertility, particularly on the wheat 'bonanza' farms and in the high country. Newly cleared land and land not previously grazed had a fund of fertility which provided a one-off gain for the farmer. However, common runholder practices such as the burning of tussock and overstocking reduced the fertility of much of the land so severely that some areas of Otago and high country elsewhere would never recover. Bush-burn agriculture in the North Island created similar problems. An initial burst of fertility, thanks to previously built-up organic material and the nutrient effect of the ashes, was soon squandered if not managed properly.[5] By the late 1880s many established farmers were concerned at the decreasing capacity of their land.

Despite this declining fertility, pastoral production continued to increase thanks to the introduction of more nutritious exotic grasses and more land being brought into production. Had declining soil fertility not been arrested by the introduction of topdressing in the early twentieth century, productivity would certainly have fallen subsequently.

Scab, Pests and Rabbits – Government Control Prior to 1892

In New Zealand the state has always been actively involved in the economy. For the first 50 years of the colony much effort was devoted to the acquisition of land, but as land was occupied by European settlers this role lessened. By the 1880s much land in the South Island was already taken up, and by the early

Right *Development of bush into farmland was a slow process when undertaken by horses or oxen. Oxen were preferable in rougher country because they needed less feed, were very powerful and could deal better with wet ground, stumps and roots.*



National Archives, MAF collection

Below *Root crops were often sown for feed and to raise the fertility of land.*

National Archives, MAF collection

twentieth century most of the North Island was settled. From about the turn of the century technological and scientific advances became crucial, enabling a government agricultural department to have a great impact.

In the early years of the colony the importation of animals was uncontrolled. Restrictions introduced in the late 1840s, such as the 1849 Sheep Ordinance and a range of provincial ordinances, were intended to protect sheep and cattle from imported diseases. The Sheep Ordinance, copied from New South Wales, was aimed at eliminating the scab mite. Restrictions on the importation of cattle were introduced under the 1861 Diseased Cattle Act. The Government, however, had no general powers to control imports of farm animals until the passage of the Animals Importation Prohibition Act in 1876. This empowered the Government to prevent the importation of any kind of animal from anywhere, if it was felt there was a threat to agriculture. Acclimatisation societies were still free to import animals subject to this consideration, but under the Protection of Animals Act 1867 could not introduce 'any fox, venomous reptile, hawk, vulture or other bird of prey'. However, they could still import and release any other animals until 1895, when the Government took complete control over the introduction of animals with the amendment of this Act. It was at this point that New Zealand's border protection began to be effective.

The animal health legislation of the early colonial period had been passed at a time when animal diseases were little understood. Its object was the isolation and destruction of sick farm animals in order to prevent the infection of other stock. However, many did not accept the contagion theory of disease. In 1865 the highly infectious and fatal disease rhinderpest ravaged the cattle of the United Kingdom in what came to be known as 'the cattle plague'. Veterinarians who advocated a policy of quarantine and the slaughtering of any animals that had had contact with infected beasts were ignored.[6] Eradication of the disease at an early stage would have been relatively simple had this advice been accepted, but by 1898, when Britain was declared free of rhinderpest, two and a quarter million cattle valued at £26 million had died. The experience impressed governments around the world with the value of the advice of veterinarians, and encouraged them to set up rigorous stock inspection and quarantine procedures.

Pasteur and Koch's work from the mid-1850s on the role of bacteria led to a revolution in the understanding of animal diseases. Veterinarians could now identify a specific disease by identifying the bacterium, and they could soon vaccinate against some diseases. It now became obvious why apparently healthy

animals exported from one country to another could come down with disease on the journey. It was also clear why some diseases were highly infectious and others of lesser concern. The implications of these findings were considerable. Quarantining became vital when animals were transported from one country to another, and the slaughtering of animals that had been in contact with infectious diseases became widespread. In New Zealand these concepts were embodied in the 1871 Diseased Cattle Act and have been an integral part of disease containment ever since.

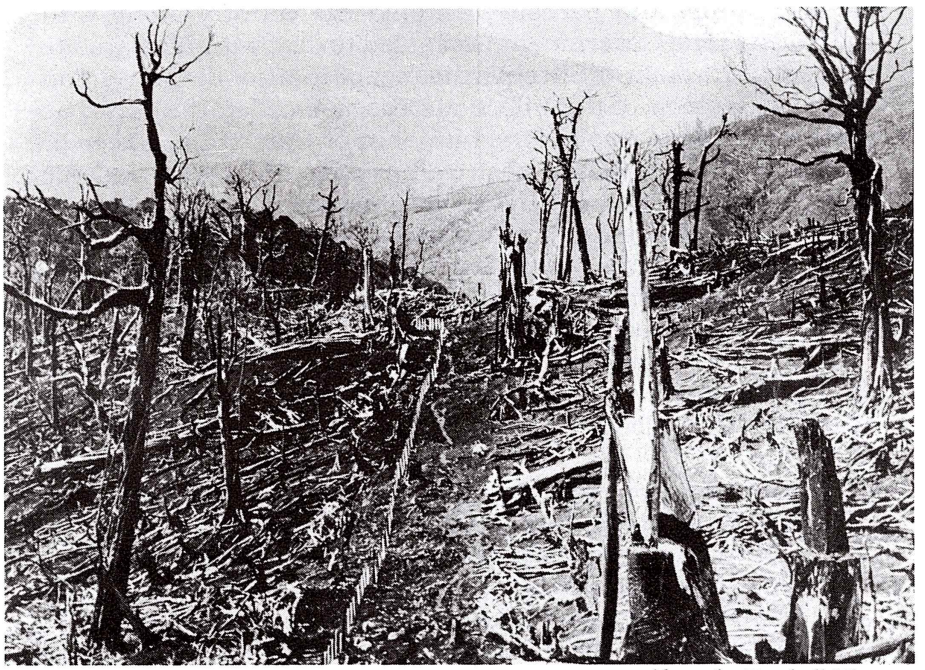
This is not to suggest that the Government had not attempted to keep animal diseases out of the colony prior to 1871. It was simply that procedures and knowledge were inadequate. Throughout the nineteenth century a vast array of viruses, bacteria, fungi and parasites entered the country along with their hosts. The Government first acted to deal with the parasite sheep scab through its Sheep Ordinance of 1849 for the prevention of 'the Extension of the Infectious Disease called the Scab, as well as the Disease called the Influenza or Catarrh, in Sheep or Lambs'. In New Zealand scab rather than influenza was the major concern. The ordinance established a system for the inspection and destruction of infected flocks, but the parasite continued to spread during the 1850s and 1860s. Inspection was uneven and officials became the targets of farmer frustration when scab-infected flocks had to be destroyed.

John Kerr, the Member of the House of Representatives for Motueka and owner of the Rainbow station, described how his sheep became infected.

> When the sheep came to his [Mr Kerr's] boundary he sent for the Inspector, knowing the sheep were coming off scabby country, and said he would not allow these sheep to go down, because he was certain they were not clean, and that if they were allowed to travel they would scab the whole country. The Inspector said, 'What can I do? These sheep are passed from Marlborough; they are dipped: I defy anyone to say they are scabby, but they are suspicious: we cannot stop them according to the Act'. The sheep were brought down. Lots of the sheep were lost, and scab was scattered in all directions.[7]

Scab could be treated with a range of drenches, using ingredients such as lime, sulphur, tobacco and arsenic.[8] The isolation and treatment of infected animals became practicable only in the late 1860s, when the rapid introduction of wire fencing helped contain flocks. The last outbreaks were in the late 1880s, and the final area to be declared clean was D'Urville Island in the Marlborough Sounds in 1892. New Zealand as a whole was officially proclaimed free of scab in 1893.

Each province developed its own system of disease management. Provincial ordinances were consolidated in the Sheep Acts of 1876 and 1878 and the Diseased Cattle Acts of 1871 and 1873. In 1875 provincial inspectors were placed under



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Prior to the availability of spun wire, fencing comprised posts and wooden rails, was difficult to maintain and had a limited life. Most sheep runs were unfenced and susceptible to outbreaks as infected sheep mixed with clean flocks. Boundary keepers were employed to keep flocks apart. The advent of wire fencing in the 1860s meant that sheep flocks could be kept apart to prevent scab and out of the bush to avoid damage to wool.

the control of the central Government to form the Stock Branch. This employed inspectors with practical farming experience who could recognise scabby and other obviously sick animals and were empowered to destroy them, leaving the farmers to carry the losses. Because the inspectors had considerable discretionary powers, and were only loosely supervised, they performed their duties with greatly varying degrees of stringency. This became a source of contention.

However cautiously, governments around the world came to recognise the dramatic progress made in veterinary medicine. Like New Zealand, the United States, Canada and Australia set up comprehensive stock inspection schemes as a result of the United Kingdom's successful battle against rhinderpest. The movement of stock between countries became more difficult, often requiring veterinary supervision and long periods of quarantine. Even the export of meat products became restricted at times, for example by a European ban (1879-91) on the importation of American pork because of concern over the trichinellosis cyst.

Stock inspectors were a distinct group who did not interact readily with other state employees. The Stock Branch underwent frequent change, mainly because its primary function – the eradication of scab – was something of a political football. Inspectors were heavily criticised for scab outbreaks, even if these were outside their control. Responsibility for the Branch was shifted between ministers and departments, in part to deflect criticism. Retrenchment in the late 1880s abolished centralised control.

While the Government was soon involved in animal health, it was not until the end of the nineteenth century that it intervened in matters of plant importation and pests.

New Zealand's success in agricultural production has always been dependent upon its ability to produce good quality high-yielding crops. An important factor has been its temperate climate well suited to plant growth, but scientific plant propagation and management has been even more vital. The Department of Agriculture has played a central role by protecting borders, containing pests and weeds, and providing advice to farmers. However, the application of scientific principles to plant management has received less public attention than successes in the meat and dairy industries.

By the early 1840s a surprisingly wide range of fruits was being grown.[9] Quality was high due to the absence of pests and diseases. Early letters and diaries often refer to the luxuriant (and pest-free) peaches that grew wild throughout much of the country. In the 1860s and 1870s acclimatisation societies were formed. While primarily set up to introduce new animals into the colony, they also imported plant species.

Some new arrivals soon became pests. Farmers had been active in bringing in small birds such as sparrows and finches to contain the damage being done to their crops by insects. The birds certainly ate the caterpillars, but they also consumed grain enthusiastically. In an environment with few predators they rapidly became a nuisance. The problem was of particular significance during the wheat boom of the 1870s, and pressure from wheat-growers led to the passage of the Small Birds Nuisance Act of 1882. Local bodies were empowered to strike a rate which was usually spent on poisoning and/or on a bounty to reduce bird numbers.

The Codlin Moth Act was passed in 1884. The moth had become established in the north and was likely to become a serious pest. Apple growers wanted it contained. The Act allowed for a rate to be struck and the money used for disease control. Neither the Codlin Moth Act nor the Small Birds Nuisance Act proved effective, however, because local bodies often neither wanted nor had the ability to enforce them, but more importantly because there was little that could be done in the short term. Pests adapted quickly to the new environment, and often thrived because competition for food and predators was lacking.

By the 1890s pests were causing farmers considerable expense. Orchardists were affected not only by codlin moths but also by leaf-roller caterpillars, pear mites, woolly aphids, scale, and a host of other accidental introductions. Experts were becoming concerned at the colony's vulnerability to imported pests and diseases.

A major concern of farmers, related to the decline in soil fertility, was the rabbit plague that erupted in the 1880s.[10] Given the scale of animal introductions into New Zealand, it was inevitable that some disasters would occur. There were frequent introductions of rabbits during colonisation, but only some were successful. By the 1870s the rabbit was well established in Southland, and in parts of Otago it was already becoming a pest.

Rabbits like areas of moderate to low rainfall with a sandy or friable soil suitable for burrowing in and prefer light ground cover. The rabbit is a prolific breeder, and can produce annually seven or eight litters of five or six young. The rabbit has colonised the entire country and proved itself able to survive alongside a variety of types of farming. Rabbits thrive in Otago, Southland, Marlborough, and to a lesser extent Hawke's Bay, Wairarapa and the King Country.

Farmers faced with declining returns turned to eradication. By the 1880s Otago and Southland runholders had to spend large amounts of money to deal with the plague and there was no immediate end to the problem in sight. Canterbury pastoralists waited in trepidation. In this decade the plague broke out of Otago, Southland and Marlborough, and rabbits hopped, burrowed and bred their way into Canterbury from both north and south. In Otago 1.3 million acres was abandoned by farmers, although two-thirds of this land was subsequently relet at much reduced rentals. These losses were minor compared with the aggregate reduction rabbits forced on stocking rates generally in the South Island. Some farmers fought the plague, but others did not; this caused considerable conflict between landholders.

Native tussock was not highly nutritious and when grazed soon became masked by a mass of unpalatable growth. Runholders thus burnt the tussock to free up the plant so that sheep could get at the new green shoots. Over time this killed off much of the tussock, which could not replace itself fast enough when grazed.

The loss of tussock unfortunately suited the rabbit. The absence of vegetation encouraged burrowing, destabilised the soil and led to erosion. The impact of different forms of farm management can be graphically illustrated:

> McLean... drew Run 2381 in the 1910 ballot. He put 6,000 Merino sheep on the 12,000 acres and spoilt it in four years by overgrazing. ... By 1919 the tussock cover was severely depleted and a rabbit plague commenced which was to last until 1956 and the introduction of 1080 poison.... [A neighbouring run] ... was balloted to Redheads who ran 2,500 Merino sheep on it. Under this low stocking rate the run was kept in good order.[11]

Runholders turned to central Government for help in paying for eradication programmes, in the belief that their lands would thereby be returned to the level of production experienced during the first 20 years of settlement.

Alexander Turnbull Library, B. MacFarlane collection

Rabbit hunting was seen as an upper-class sport in Britain and some settlers viewed it similarly.

The 1876 Rabbit Nuisance Act was the beginning of a long process of defining the relationship between farmers and the state on this issue. Under the Act rabbit destruction was clearly the responsibility of the farmer, but there was government support for the creation of rabbit boards. On the petition of ten farmers, a board with the power to rate all farmers within that area could be created. The task of such boards was to ensure that farmers killed the rabbits, but if this was not done the board

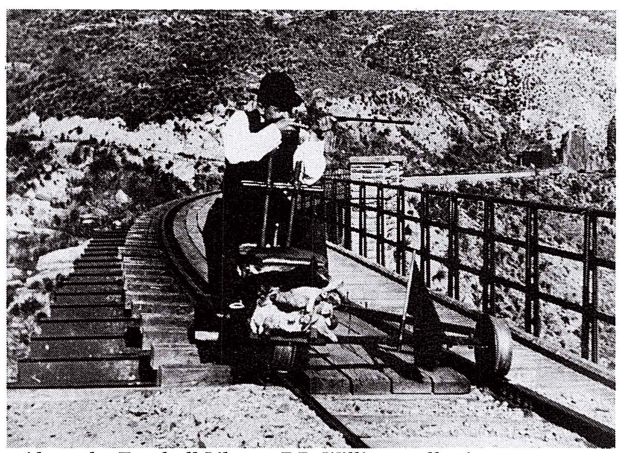
could take action. This Act, like all subsequent rabbit control measures until 1971, was based on complete eradication. It proved exceedingly difficult for inspectors and boards to enforce the law to the hilt because eradication was impossible.

Under the subsequent Rabbit Nuisance Acts of 1880-82, Stock Branch sheep inspectors with considerable power took over from boards. Inspectors decided whether a farm was infested,

Alexander Turnbull Library

Right *The scale of the rabbit problem meant that hunters were employed to destroy the pest.*

Below *Some hunters thought up novel ways to shoot rabbits!*



Alexander Turnbull Library, E.R. Williams collection

and farmers were obliged to pay for eradication; there was no right of appeal. The inspectors were the subject of frequent attacks by rural-based politicians who demanded a reduction in such powers.

The 1886 Rabbit Nuisance Act marked a turning point in official attitudes. The boards were reinstated and made responsible for control, while the powers of the inspectors were redefined. The Government now subsidised rabbit boards pound for pound, thus accepting considerable responsibility for rabbit destruction. Farmers came to regard this role as of fundamental importance. This political solution appeased farmers, but failed in the long term to contain rabbit numbers.

In the 1880s and 1890s farmers experimented with rabbit fences; this approach was the last hope of runholders in Canterbury and Hawke's Bay. Farmers and rabbit boards alike put up fences, including one that stretched 40 miles between southern Hawke's Bay and the Wairarapa and another of 80 miles in South Canterbury. These fences did not, however, prevent the spread of rabbits. They were difficult to maintain, and it seems that rabbits had already colonised the areas to be protected before construction was complete.

The Late Nineteenth Century – a Turning Point

Industrialisation in Britain, by creating a mass market for some products that were previously considered luxuries, had implications far beyond its shores. People of relatively modest means could now regularly consume meat and dairy products, for example. This mass market had been developing since the time of New Zealand's colonisation, but it was not until the advent of refrigeration that its potential could be realised. The voyage of the *Dunedin* in 1882 was a landmark that foreshadowed the effective use of refrigeration by the mid-1880s to ship frozen meat halfway around the world.[12] The development of more efficient chilling facilities also helped the growth of an international trade in dairy products in the 1890s. The declining real cost of refrigerated space on vessels kept meat exports going, despite a slump in meat prices in the late 1880s and the mid-1890s.

The development of refrigerated shipping created the potential for New Zealand farming to expand rapidly. This message was

clear from the early 1880s, but the depression, the limited availability of productive land for new settlement, and the low productivity of most farming operations meant that it was a considerable challenge to New Zealand farmers to adapt and innovate. Government assistance was to prove vital in developing these exports.

New Zealand could not count on access to the British market simply because it was a colony. While Britain was committed to free trade, this was largely because its competitive advantage in a wide range of manufactures made unrestricted trade with other countries profitable. A corollary of this policy was that other countries had free access to British markets. However, Britain was at a disadvantage in agriculture, and British farming suffered at the hands of more efficient pastoral producers such as Canada, Denmark, Argentina, Australia and New Zealand. The free trade policy was of enormous benefit to New Zealand, and also extremely fortuitous, as historically, open markets for agricultural produce have been the exception rather than the rule. The boon of refrigeration was, of course, shared by New Zealand's competitors, and the open market forced New Zealand to compete in terms of both price and quality. In the 1880s the under-capitalisation and lack of organisation of New Zealand's meat and dairy industries led to criticism of its pastoral products, and there was real concern that New Zealand's exports would be seen as inferior and receive lower prices.[13]

Banks became increasingly cautious about investment in farming, particularly after the collapse of the Glasgow (1878) and Oriental (1884) banks. Falling wool and wheat prices reduced farmers' incomes and left many with mortgage commitments beyond their means. This conservative lending policy continued for a considerable time, until meat, wool and dairy prices began to rise after 1895.[14] Farmers caught between falling prices and a hostile climate for borrowing had no recourse but to turn to the Government.

The Government now began to consider a more active role, as there was a growing acceptance that the state could intervene more directly in the organisation of agriculture and the education of settlers in modern farming techniques. Debate on assistance to agriculture centred not so much on whether this was an appropriate role for the state, as on the form and level of such

assistance. The Government's first contribution was to silk culture and olive growing. The Crown Lands Department arranged for the importation of silkworms in 1881, and funded an expert to lecture around the country and produce a pamphlet on silk culture. He also gave advice on growing olives and grapes.[15] Considerable sums of money were given to nurserymen in the early 1880s for the distribution of various plants. In 1884 there was consideration of more direct intervention in distribution by the state, but this was not taken up. In the same year funds were given for the investigation of grasses. In 1883 William Bowron had become the first government dairy instructor, on a short-term contract. He toured around the country visiting about a dozen of the most important dairy factories, including Edendale. His report urged the co-operative principle upon the New Zealand industry; only one factory here had adopted this form of organisation by that time.[16] He emphasised the need for high-quality products and acknowledged the considerable teething problems of the industry. He was the first of a number of instructors who travelled the country lecturing and demonstrating the new techniques associated with commercial dairy production.

By the mid-1880s the Crown Lands Department had acknowledged officially a general function concerning the 'procuring and disseminating [of] information bearing on the introduction of new agricultural industries suitable to the varied soils and climate of New Zealand'.[17] This it did particularly in the areas of dairy management, olive and silk culture and subtropical fruits. 'Native schools' became a vehicle for distributing various plants into the countryside; they were the recipients of mulberry and olive trees, as well as wattles, arrowroot plants, date palms and carob trees, amongst others! The Department now became interested in fostering subtropical and other fruits; a pamphlet was produced on citrus culture and reports were made on fruit and citrus growing. At the same time bonuses were offered for the commercial production of silk, ostrich feathers and linseed oil, amongst other products. While some bonuses were never taken up, many were. The Edendale factory in Southland won bonuses for being the first factory to produce 25 tons of cheese and 50 tons of butter in 1883-84.[18]

Dairy farmers and dairy factory operators sought government

National Archives, MAF collection

The Edendale factory in Southland was the first to produce and export commercial quantities of cheese and butter in the early 1880s.

assistance for a variety of reasons. The dairy industry needed to raise its product standards in order to compete in the United Kingdom. Dairying had been small in scale and localised. Standards remained low in the 1880s when exporting began. Early shipments of cheese and butter often received low prices because of poor quality and bad handling. Denmark, Canada and the United States already had considerable expertise in dairying, while New Zealand lagged behind. The experience of these other countries showed that it was necessary to train everyone involved, from farmer to manufacturer to exporter. Legislation to control standards and the provision of dairy instruction by governments had become features of the industry internationally.

In 1885 the Stout/Vogel ministry moved to create a more comprehensive agricultural service. In May Walter de Grex Reeves was appointed to head the new Agricultural Branch of the

Department of Crown Lands. A man of wide experience, Reeves was given the job of advising the Government on agricultural matters at large. Reeves produced reports on imported agricultural products in which New Zealand could become self-sufficient, new types of farm machinery, and the dairy industry before his death in 1887. He, together with T. Kirk, Chief Conservator of State Forests, had investigated the possibility of establishing a School of Forestry, Pomology (pip-fruit orcharding) and Agriculture on a 4,000-acre block at Kioreroa adjacent to Whangarei.[19] They felt that, while it was an excellent site for a forestry school, it was not suited for other purposes because of the poor soil. It would also not function well as an agricultural school because the local conditions were atypical and because of its lack of centrality.

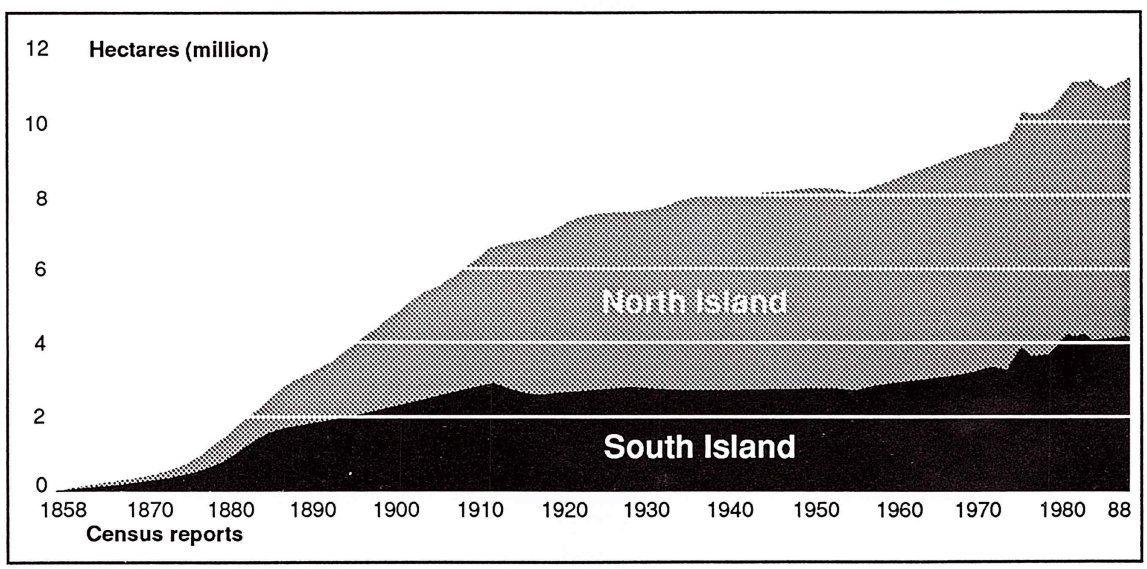
In the end a school was not established. Instead the land was used as an experimental block for trees, with 100 acres of better soil used for an orchard. Huge numbers of trees were planted, largely wattles, eucalyptus, oaks, plane trees and pines, with apples, pears, oranges, lemons, citrons, plums, hickory and walnuts in the orchard. Kioreroa (which was eventually handed over to the Whangarei County Council in 1890) was a forerunner of the Department of Agriculture's later experimental farms.

However, this significant first step did not really flourish because of a change of government at the end of 1887, when H.A. Atkinson formed a ministry committed to retrenchment. The new Minister of Lands, G.F. Richardson, failed to appoint a new head to succeed de Grex Reeves (who had died in October 1887), and the forestry aspects of the department's operations were curtailed. However, the Kioreroa block was maintained and the Agricultural Branch continued to assist various rural industries. Atkinson's Government did not repudiate the idea that the state should foster scientific agricultural techniques, but simply argued that only a limited amount could be done given the need for retrenchment. In the late 1880s further funding was given for the investigation of grasses, and the first two parts of Mackay's manual of grasses and forage plants were published.

The dairy industry was seen as increasingly important, and in 1887 an 'expert' was employed to visit factories and advise on management. In 1888 R. McCallum, the Edendale manager, gave lectures throughout the country on dairy factory organisation, and he subsequently published a booklet stressing the

importance of the co-operative approach. After an unsuccessful search in the UK, John Sawers, a dairy factory manager, was recruited into the department as a permanent dairy instructor in 1889.[20]

The failure to establish a School of Agriculture in 1885 left those looking for government assistance divided. Northern farmers called for the formation of a government department, while those in the south wanted state recognition and support for the Canterbury Agricultural College at Lincoln.[21] The Government prevaricated. In answer to a parliamentary question in July 1889, Atkinson argued that there was no reason to appoint a Minister of Agriculture because the Minister of Lands already served that function.[22] Yet less than three months later, in October, the Government changed its mind, and Richardson was given the title of Minister of Agriculture. But this could hardly be described as a dramatic move, since no provision was made to form a department and the change elicited no comment in Parliament.



New Zealand Official Yearbook, 1990

By the 1890s the area of farmland in the North Island was beginning to outstrip that in the South Island for the first time.

By the turn of the decade many felt that the opportunities presented to the pastoral industry were being allowed to slip by. Wool, meat and dairy prices were low, and farmers had not changed their methods to the extent that would be necessary if refrigeration was to be taken advantage of.

Administrative Developments Prior to the Establishment of the Department of Agriculture [23]

1875	30 provincial sheep inspectors form the Stock Branch of the Crown Lands Department.
1878	Sheep Act defines the powers and terms of appointment of sheep inspectors.
1881	Diseased Cattle Act extended to include control over all major farm animals.
1883	William Bowron appointed first dairy instructor.
1885	Agricultural Branch set up in the Crown Lands Department to provide information on rural industries.
1888	Stock Branch decentralised; Chief Inspector position abolished.
1889	John Sawers appointed dairy instructor in Crown Lands Department.
1890	Appointment of a Minister of Agriculture.
1892	The Department of Agriculture formed by the amalgamation of the Stock Branch and the Agricultural Branch.

The Liberals Come to Power

Prior to the 1890s, New Zealand did not have a modern party system of government, and even the new Liberal Party was bound together only by limited formal ties. The Liberals had no cohesive manifesto for the 1890 election but were led by prominent parliamentarians who had supported the Stout/Vogel ministry and were united by a dislike of the Atkinson Government's austerity measures. Yet the difference between the Liberals and Atkinson was, initially, slight. The Liberals' economic

policies promised continued austerity but with a more humane face.[24] In the speech from the throne, the Liberals promised smaller farmers land reform, and the creation of a Department of Agriculture – providing that such a body did not cost anything.

The Liberals took office on 24 January 1891. The new Minister of Lands and Agriculture was John McKenzie, the member for Waikouaiti. While McKenzie was a reasonably prosperous settler, his Highland Scots background and experience of the eviction of the crofters in his formative years had led him to identify strongly with the small landowner. He was suspicious of the runholders, whom he equated with the landlords of the Highlands. His particular bugbear was land aggregation, which he opposed vigorously. His repeated attempts in the 1880s to introduce legislation to limit the size of an individual's holdings, and his attacks on those who used surreptitious means to get around restrictions on land aggregation, meant that he was held in high regard by small settlers and in contempt by many runholders.[25]

McKenzie was considered an expert on land issues. He also had close links with the agricultural and pastoral associations, which he developed into a system of formal consultation on major issues. This desire to consult farmers before committing the Government to a course of action proved to be his great strength.

As Minister of Lands he was responsible for the Land for Settlements Act of 1894 and the creation of the lease-in-perpetuity. This was the first lease system without a freehold option to be offered on state land, and was designed to place settlers of limited capital on farms. It was the freehold in all but name, and was a compromise between those who supported state ownership of land and those who believed in the freehold. McKenzie generally worked closely with the Treasurer, Joseph Ward. Without Ward's Advances to Settlers Act of 1894, which in essence forced banks to lower their lending rates and provided an alternative source of cheap finance, most of McKenzie's land legislation could not have been effectively implemented.

McKenzie's argument was moral in character; if he had an understanding of the significance of the fundamental economic changes the colony was experiencing, it was intuitive rather than articulated. His initial view that small settlers could farm part-time and remain dependent on other sources of income was

This caricature by Vivian Hunt reveals a lot about Sir John McKenzie. He was fiercely proud of his native Scotland, and still had a strong Gaelic inflection because English was not his native tongue. His opponents characterised him as a buffoon, but he earned widespread respect for the success of his land and agricultural legislation. On his death in 1901 many country dwellers felt that they had lost a firm friend.

Alexander Turnbull Library

quickly discarded when he became aware of the increased viability of smaller, more intensive farms. McKenzie's pragmatism allowed him to realise his vision of a small-landholding democracy through more intensive agriculture. He was wary of intellectuals, but did see advantage in hiring experts to advise him. He could be persuaded to intervene if it was demonstrably to the advantage of agriculture. McKenzie's contribution was to use his considerable political skill to get measures devised by the experts passed.

The Origins of the Department of Agriculture

A range of political pressures pushed the Liberals towards the formation of a Department of Agriculture. There was agitation for a restructuring of the stock inspectorate, whose powers were perennially controversial and often the subject of complaint, usually from disgruntled farmers who had had stock destroyed or who had been forced to deal with rabbits. Accusations of high-handedness had culminated in allegations of financial impropriety against specific inspectors in 1890 and 1891.[26] McKenzie defended his departmental officers, but was also quick to fill the vacuum and appoint someone to take overall responsibility for stock inspection. John Douglas Ritchie, who had once been McKenzie's neighbour, was appointed Chief Inspector of Stock in May 1891.[27] He was an experienced farmer who had managed the Otago estates of his uncle, John Douglas.

The most articulate call for a Department of Agriculture was made by the Greyite Liberal Robert Pharazyn in the Legislative Council on 4 September 1891. He pointed out the obvious: a Minister of Agriculture existed, but not a department. Pharazyn emphasised the great need of farmers for scientific information and noted the success of such departments in North America and the colonies of Australia, while criticising the Government for its dilatory approach to the question. He underlined his point by describing how the bureaucracy currently responded to enquiries of a scientific nature.

> It cannot be proper that the Department [of Crown Lands], if it requires information, should send first of all to the Geological Survey Department, and then, as I know has been done on various occasions, to an officer in the

> Telegraph Department who knows a great deal about insects, and, on other occasions to an officer of the New Zealand University who also knows a great deal about insects in their relation to agriculture.[28]

Pharazyn's call was picked up by Opposition members in the House of Representatives. William Russell, for one, noted that a Department of Agriculture would have implications for public health. Veterinarians could more effectively inspect slaughterhouses and enforce the frequently flouted hygiene standards. However, McKenzie poured scorn on the Opposition's enthusiasm for a department, noting that when in government themselves they had done nothing. He forestalled further argument by stating that no further action would be taken until he had consulted with the agricultural and pastoral associations in the New Year.[29]

Consultation on matters concerning land and agriculture had previously been informal. Many members of the House had farming connections and their advice was often sought. Wider consultation was achieved largely by submissions to the Livestock Select Committee. McKenzie took the process of consultation a step further. He called for comment by the associations to which he circulated his major land and agricultural bills.

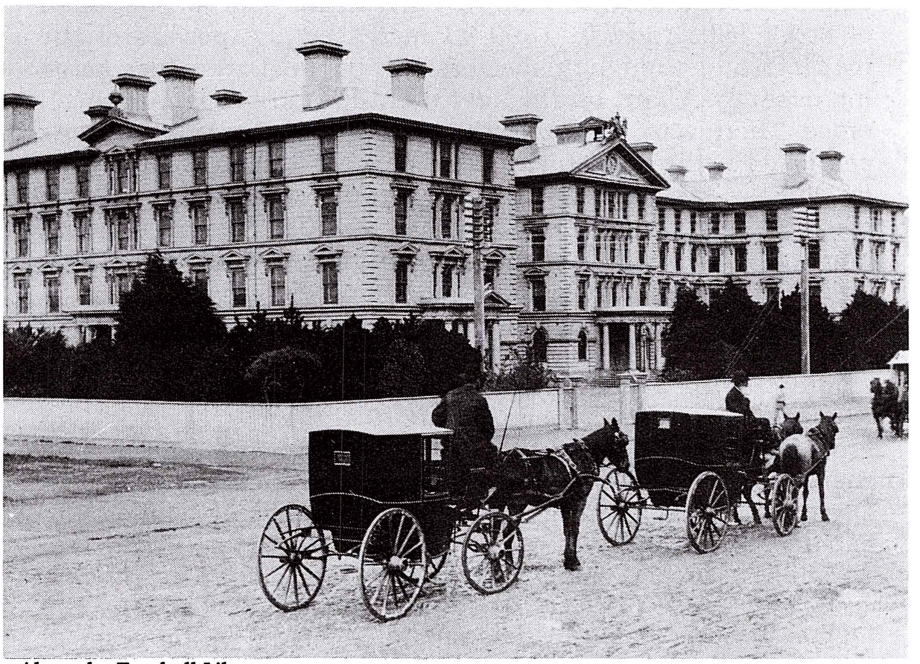
Agricultural and pastoral associations functioned in a distinctive way in New Zealand. They had been set up as non-political organisations to share information amongst farmers and to raise the standard of farming; by the 1890s they were established throughout most of the country. They included in their ranks not only a wide range of farmers, but also representatives of related industries. While there was no national organisation, they successfully articulated the interests of farmers.[30]

McKenzie was widely praised for his consultative process, which proved an effective means of preparing legislation despite an often hostile Legislative Council, many of whose members had been appointed by the previous Government. McKenzie further formalised the system by calling the first national conference of A&P associations in March 1892. The conference gave the highest priority to the formation of a Department of Agriculture, and also called for the employment of veterinarians trained in the new science of microbiology, an entomologist, and

more dairy instructors. McKenzie's response was to establish a department immediately.

Formation and Growth of the Department

The Department of Agriculture was formed on 31 March 1892 by the amalgamation of the staffs of the Stock and Agricultural Branches of the Department of Crown Lands.[31] J.D. Ritchie, the Chief Inspector of Stock, now became the first Secretary of Agriculture, with the duty 'to collect and distribute information on subjects connected with agriculture among the settlers by means of lectures and pamphlets, and generally to study and promote the welfare of the farming community', in the words of Premier John Ballance.[32] The Government acknowledged the importance of continuing with the assistance already given to



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The head office of the Department of Agriculture was in the Government Buildings opposite Parliament from 1892 to 1913.

the expanding dairy industry, and undertook to look at establishing several experimental farms.

The 35 stock inspectors were joined by the three dairy instructors and one nurseryman from the Agricultural Branch. Priority was given to the fledgling dairy industry, in accordance with the expressed desire of the A&P associations. The instructors' main role was to educate farmers and producers in techniques of mass production. The importance of hygiene in all facets of production was emphasised.

The Department grew steadily. The 83 permanent staff of 1892 had increased to 371 in 1910, by which time the Department's structure – it comprised Livestock, Dairy, Orchards, and Fields Divisions – had evolved.[33] The Department had inherited a complex system of livestock inspection and quarantine. A network of inspectors was controlled from Wellington by the Chief Inspector of Stock. Two recently qualified veterinarians hired at the end of 1892 became the first professional employees of the Department of Agriculture. The consolidation of stock legislation in 1892-93 increased the powers of the inspectorate, though inspectors in the field were becoming increasingly reliant on the advice of the veterinarians in head office. There was rapid growth in the number of veterinarians employed by the Department between 1893 and 1900. Six joined in 1898, and the total reached 31 in 1901 following the passage of the Slaughtering and Inspection Act. By 1910 the veterinarians dominated livestock services, quarantine and meat inspection, and the number of inspectors had almost halved.

The Dairy Industry Acts of 1892 and 1894 altered the function of the dairy instructors. Their primary concern was now to enforce this legislation and maintain standards set in consultation with the dairy associations. By 1910 the Dairy Division had grown to 31 staff, 11 of whom were dairy instructors who covered the entire country with considerable help from the Livestock Division. Four dairy produce graders were located at the main export ports, and the remainder of the Division comprised administrative and clerical staff.

In 1893 T.W Kirk was appointed as the first departmental biologist. After an international conference of fruitgrowers in Wellington in May 1895, the Department, in association with the fruitgrowers, attempted to contain orchard pests. Following the passage of the Orchard and Garden Pests Act of 1896, the

horticultural inspectors played a policing role similar to that of the inspectors in the Livestock Division. This was extended to the beekeeping industry under the 1906 Apiaries Act. By 1910 the Orchards, Gardens and Apiaries Division comprised seven fruit inspectors, 13 orchard instructors, four apiary instructors and a viticulturist, as well as administrative and clerical staff.

The 1892 A&P conference had clearly wanted the Department to assist in providing farmers with scientific information. This was attempted initially through experimental farms. In 1893 the Department acquired two properties, at Moumahaki near Waverley and Waerenga (later Te Kauwhata) in the Waikato. By 1910 nine such farms had been established: Arataki, Bickerstaffe, Lichfield, Motuihi Island, Moumahaki, Ruakura, Tauranga, Waerenga and Weraroa. The Fields Division's duties demanded considerable resources as it had expanded greatly. By 1910 it had 101 staff and a budget of over £54,000, nearly a third of the Department's total budget.

Various other activities, including soil analysis, flax grading, the provision of poultry advice and the inspection of manure imports were undertaken in response to specific needs. In 1900, B.C. Aston was appointed to the position of agricultural chemist. His initial task was to analyse soil samples to detect deficiencies and make recommendations to farmers on fertiliser use. Aston worked alone for some time, but his efforts laid a foundation for the national soil survey which was to be undertaken by the DSIR between the 1930s and 1969.[34] A poultry expert was employed from 1895; by 1910 four experimental chicken farms had been established. It was hoped that an export trade in chicken meat and eggs might develop, but the high cost of feed and the small domestic market meant that New Zealand could not compete with overseas producers.

The Department established a manure sterilisation unit in 1904, and J.A. Gilruth, the Chief Veterinarian, had planned to set up sterilisation plants at all major ports to deal with diseases such as blackleg and anthrax. The Department eventually decided, however, to base two officers overseas, in India and Australia, to ensure effective sterilisation at the point of manufacture. In 1909 the Department was made responsible for the grading of flax fibre for export, in an attempt to boost a declining trade by ensuring high quality. Five hemp graders were employed at the appropriate ports.

REORGANIZATION OF THE DEPARTMENT.

THE Hon. the Minister of Agriculture, Industries and Commerce, and Tourist and Health Resorts directs me to inform the staff that the undernoted reorganization of the Department has been decided upon, to take effect at once.

1. The Departments of Agriculture, Industries and Commerce, and Tourist and Health Resorts shall be combined into the Department of Agriculture, Commerce, and Tourists.

2. All the existing Divisions of the Department of Agriculture shall be abolished, and the new Department shall be divided as follows:-

(A.) The Head Office.

(B.) The following Divisions, viz.:-

(i.) Live-stock and Meat Division;

(ii.) Fields and Experimental Farms Division;

(iii.) Orchards, Gardens, and Apiaries Division;

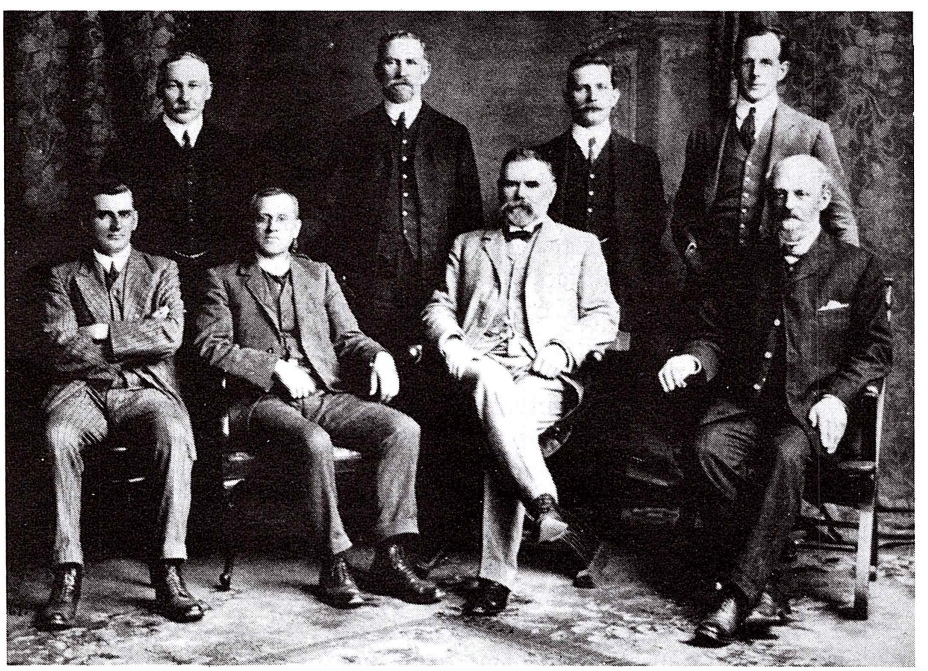
(iv.) Dairy-produce Division; and

(v.) Commerce and Tourists Division.

(C.) A District Agency at each of the undermentioned places, viz.:-
Auckland, Napier, Wanganui, Wellington, Christchurch, Dunedin, and Invercargill.

***Annual Report*, Department of Agriculture, 1910**

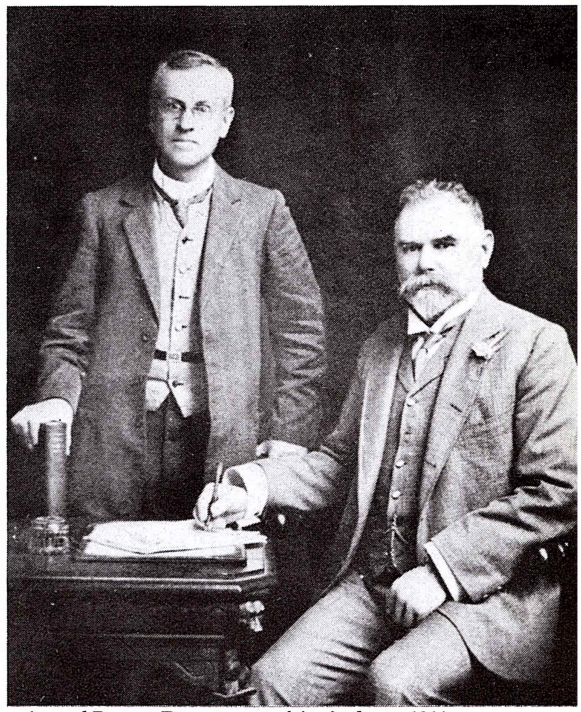
The Department of Agriculture, Commerce and Tourists was created during a general restructuring in 1909. The experiment proved unsuccessful, and by 1919 the three departments were again administered separately.



***Annual Report*, Department of Agriculture, 1910**

Right *The Department of Agriculture, Commerce, and Tourists. Mr F.S. Pope, the Secretary of the Department, and the Hon. T. Mackenzie, FRGS, the Minister in Charge. F.S. Pope became Secretary of Agriculture in 1909. Like his predecessor J.D. Ritchie, he had no academic qualifications. Pope initiated the restructuring of 1909-10, and guided the Department through it.*

Opposite Below
SITTING, FROM LEFT: C.J. Reakes (Director of Live-stock and Meat); F.S. Pope (Secretary of Agriculture, Commerce, and Tourists); Hon. Thomas Mackenzie (Minister in Charge of the Department); E. Clifton (Director of Fields and Experimental Farms).
STANDING, FROM LEFT: D. Cuddie (Director of Dairy-produce); T.W. Kirk (Director of Orchards, Gardens, and Apiaries); C.R.C. Robieson (Director of Commerce and Tourists); L.E. Johnson (Private Secretary to Minister).



***Annual Report*, Department of Agriculture, 1911**

So why did the New Zealand Government create a Department of Agriculture? First, the Department was a response to the impact of refrigeration. An overseas market for meat and dairy products with huge potential had suddenly emerged. Produce could now be sold in quantities undreamed of, while quality standards had to be greatly improved to compete on the world market. At the same time farmers were finding it difficult to maintain production levels. The Department could enhance quality through its instruction and inspection duties, while the promotion of fertilisers and new techniques could assist in the growth of output. The second major factor was the need for experts able to translate scientific discoveries with the potential to increase production into practical advice to the farmer. Veterinarians could identify diseases and recommend remedial action. Discoveries in microbiology made dairying on a scale

previously unimagined possible, but this required the application of science and scrupulous attention to hygiene.

Biographies

John McKenzie

John McKenzie was born on Ardross estate, Ross-shire, Scotland, in 1838. His father was a progressive and moderately successful tenant farmer. The Ardross estate was well known throughout Britain for its innovative methods of drainage and fencing, and the use of lime as a fertiliser. The young McKenzie witnessed the eviction of crofters from their land, and this had a profound effect on him. He came to revile 'landlordism' and to believe ardently that small farmers should have secure tenure.

National Archives, MAF collection

Sir John McKenzie.

McKenzie arrived in New Zealand in 1860 and went to work for Otago whaler-turned-landowner Johnny Jones. An excellent stockman, he was by 1863 managing Jones's giant Puketapu run. In 1865 he bought a 76-acre property north of Palmerston. Despite his limited capital he became involved in local politics and in 1871 was elected to the Otago Provincial Council. In 1874 he moved to a 1,000-acre property near Dunback, and with the demise of the provincial system he became a member of the Waikouaiti County Council when it was established in 1877, and the first chairman of the Waihemo County Council in 1882.

In 1881 McKenzie was elected as Member of the House of

Representatives for Moeraki. His primary interest was land legislation. He led campaigns to limit the size of cattle and sheep herds and to control the practice of 'dummyism', whereby big landowners added to their estates by buying in the name of 'dummies', such as their children. Both campaigns were unsuccessful, but they did draw attention to McKenzie as a friend of the small settler. In 1884 he moved to an 800-acre property near Shag Point and became whip for the Stout/Vogel ministry of 1884-87. In 1891 Liberal leader John Ballance, who had been Minister of Lands in the Stout/Vogel ministry, appointed McKenzie to the Lands and Agriculture portfolios.

McKenzie's ready identification with struggling farmers was reflected in the Liberals' land legislation. He helped pass the 1891 Land and Income Assessment Act, the 1892 Land Act (creating the lease-in-perpetuity), and the 1894 Land for Settlements Act. As Minister of Agriculture he was responsible for setting up many of the controls and support mechanisms that assisted twentieth-century New Zealand agriculture.

McKenzie opened up land in the South Island through the subdivision of great estates, but a much greater area was made available for settlement in the North Island. The 1893 Native Land Purchase and Acquisition Act simplified the system for purchasing communally-held land and, together with other legislation, enabled the alienation of 3.2 million acres of Maori land by 1900.

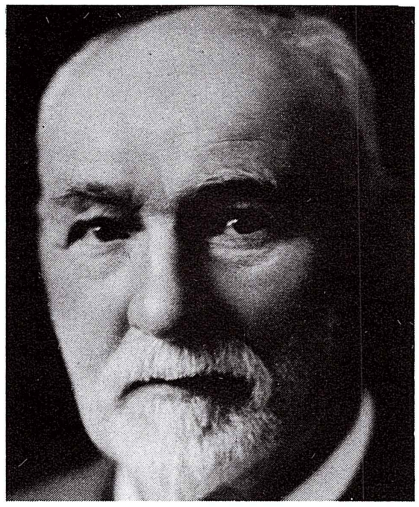
McKenzie was a hard-working, populist politician committed to a policy of land for small settlers at a time when the economics of farming encouraged more intensive land use. His health failed in 1897 and he went to London for an operation for cancer. On his return in 1899 his condition deteriorated and he resigned from Parliament in June 1900. McKenzie was knighted six weeks before his death on 6 August 1901.[35]

J.D. Ritchie

John Douglas Ritchie was born at Coupar, Angus, Scotland, on 9 October 1853. The eldest son in a farming family, he arrived in New Zealand in 1877 and managed one of the estates belonging to his uncle, John Douglas, a major Otago runholder.

Ritchie became Chief Inspector of Stock in May 1891, and in 1892 was made the first Secretary of Agriculture while retaining his earlier duties. Ritchie guided the Department through its first 16 years,

during which it grew from a staff of fewer than 100 to nearly 500 (including temporary employees). Ritchie resigned in 1909 to become permanent head of the Land for Settlements Department, a position he held until his retirement in 1927. He died on 30 July 1933.[36]



National Archives, MAF collection

J. D. Ritchie.

Chapter 2

Initial Development of Departmental Functions

The Dairy Industry

Government intervention in the dairy industry was a pragmatic response to the opening up of the British market. Dairying was an infant industry in New Zealand, well behind rivals such as Denmark and Canada in terms of both organisation and quality, and the Dairy Division had a crucial role in its development. Most important was the promotion of co-operative dairying as a way of overcoming mistrust between producers and processors. By the 1900s the Government had a high level of involvement and this was to continue for much of the century. Prior to the First World War, legislation raised both the standard and quantity of dairy production greatly and made New Zealand a leading exporter.

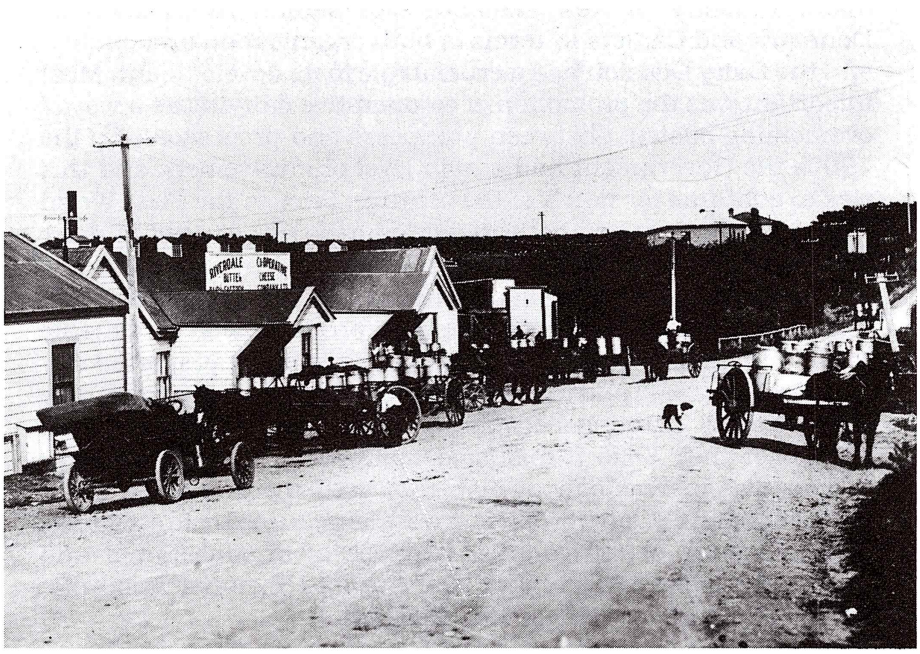
Dairying became established during the 1880s, but the early factories remained small because their products were perishable and could neither be stored for long periods nor transported any distance. Taranaki and the Waikato were identified as particularly attractive for dairying because of their high rainfall and the fertility of their soils if managed appropriately. Land in these regions was increasingly available for settlement.

New Zealand's dairy producers were largely unable to capitalise on the advent of refrigeration because of organisational and technical problems. Denmark, Canada and Victoria, Australia, were held up as models for New Zealand.

Problems in the Late Nineteenth Century

That an export industry was slow to develop was not surprising given the barriers that had to be overcome. Increased production gave rise to variable quality. The skills pioneered elsewhere were novel in New Zealand; the dairy industry was haunted by the ghosts of companies which failed because of their poor techniques.[1] Farmers producing butter and cheese for local markets only had little reason to be concerned about bacterial growth because the product was consumed immediately, but once they began to supply customers on the other side of the world hygiene standards became critical.

Production was hampered by poor transport facilities. It was vital for farms and dairy factories to have good road and rail links. Milk had to be transported to the factory regularly, and cheese and butter had to be forwarded to ports. Industry-wide organisational problems restricted growth, and manufacturing



National Archives, MAF collection

National Archives, MAF collection

Opposite, right and below
The co-operative system advocated by the Dairy Division proved popular with dairy farmers. The factories were a meeting place for families who otherwise had little contact with each other. As roads improved, milk was collected by truck and later by tanker.

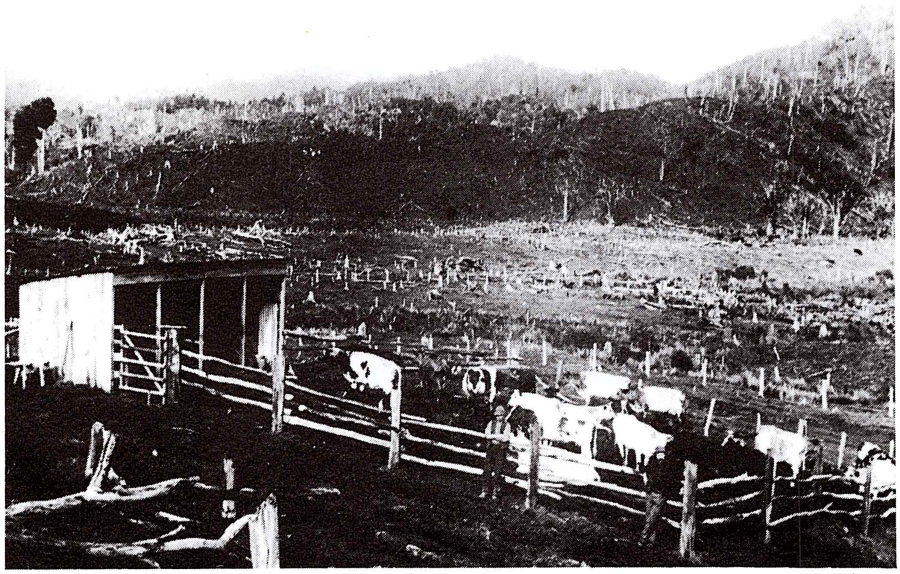
National Archives, MAF collection

processes were unhygienic. The major problem was suspicion and competition between factory owners and dairy farmers. Factories were largely operated by private companies; farmer mistrust and price competition in pursuit of an increased share of the milk supply led to bankruptcies and a lack of confidence in new ventures.

The co-operative organisation of dairy factories being advocated by the Dairy Division seemed to provide a more effective framework within which producers and processors could settle their

differences. Dairy experts believed that the co-operative system would not only help to solve the industry's organisational problems but also enhance the quality of production. Many variables were involved, including the cleanliness of equipment, milking techniques, feeding and stock management, and it became common for factories to encourage improvements by an informal system of grading. It was also felt that if farmers shared in the ownership of the dairy factory on the co-operative principle they would identify with its operation and its products, and accept its judgements as to the quality of their milk.

By the late 1880s co-operative organisation was becoming more widespread, but the reluctance of financial institutions to lend money hampered development. Dairy farmers looked to the



Ruakura

Above and opposite *Dairying expanded rapidly in Taranaki between the 1890s and the First World War. The dense bush was partially cleared, the felled material was allowed time to dry, and then it was burnt. Seed was sown in the ashes, which together with the built-up organic matter in the soil brought on rapid grass growth. Stumps were removed much later after they had begun to decompose. It took many years to get a paddock to the stage that it could be ploughed to renew pasture.*

National Archives, MAF collection

Massey University Library

Government to encourage co-operatives and so assist the growth of the industry. The Government continued to play its part. The 1908 Dairy Industry Act permitted co-operatives to register under the Companies Act and to buy back shares should a shareholder withdraw. Non-shareholders with marketing expertise could now serve on the boards, while the usual attendance requirements for directors' meetings were relaxed in recognition of farmers' commitments.[2]

A large-scale export industry required that suppliers work together to produce to a uniform standard. The quality of each farmer's milk was important, but it was very difficult to identify individual good and poor suppliers. The most important variable was the level of butterfat in the milk. From the early 1890s it became possible to test for butterfat content using the Babcock test.[3] This was soon used extensively. Farmers were now offered incentives to produce milk of high value for butter and cheese making.

The new cream separator, which was widely available by the 1890s and designed to increase processing capacity, itself contributed to poor quality. Farmers using it sent less volume to the factory, and deliveries were made less often, leading to the cream becoming stale. When used in buttermaking, stale cream

Ruakura

In the 1880s dairy cattle were few and most were milked by hand, often in the field. By the 1890s many farmers had sheds and the first milking machines were making an appearance on the properties of those with capital. The whole family could be involved in milking, sometimes to the detriment of children's education. The Labour Department investigated this question in 1903, but little was done. The development of milking machines eased the problem.

created an unpleasant fishy taste which was an unfortunate characteristic of much New Zealand butter at the turn of the century. Early milking machines also caused difficulties; while they reduced the need for farm labour, they were difficult to clean and often contaminated the milk.

The dairy industry also became a focus of concern about public health. Local authorities were responsible for the quality of the town milk supply, but this control proved ineffective.[4] The work of the Pasteur Institute in Paris had made people more conscious of the dangers of drinking untreated milk. The Departments of Agriculture and Health both took a particular interest in this issue early in the twentieth century. This culminated in a report in 1913 that suggested that public institutions should purchase milk only from herds certified as TB-free by the Department of Agriculture.[5]

The Department and the Dairy Industry

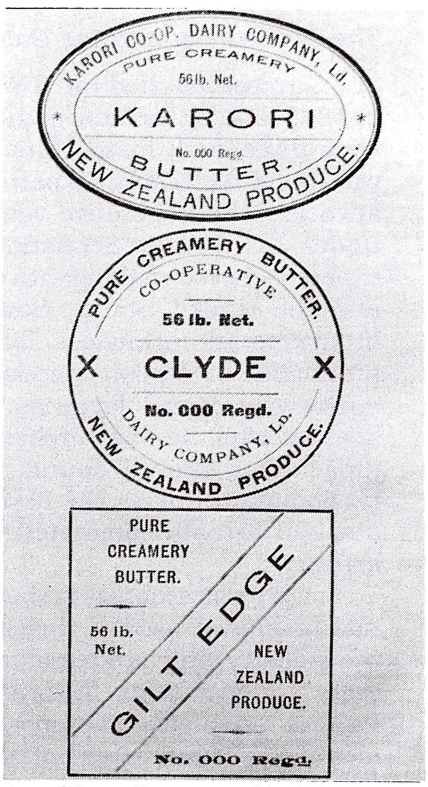
The Government had hired William Bowron as a dairy instructor in 1883, and by the time of the formation of the Department there were three such instructors, headed by John Sawers.[6] Sawers was the Chief Dairy Expert from 1889 to 1895 and a strong advocate of co-operative ventures. In 1884-85 he had trained under J.B. Harris, Scotland's Dairy Instructor, a pre-eminent expert in cheese-making with extensive experience in both Canada and the United States. Sawers displayed the effect of these international influences by promoting in New Zealand the production of English cheddar using Canadian techniques in co-operatively owned factories based on American practices. He adapted what he was familiar with to fit local conditions, and his judgements proved sound. The co-operative system became predominant during the first decades of the twentieth century, and had virtually eliminated privately-owned enterprises by mid-century.

Sawers's first job was to show both farmers and factory managers how to improve quality. He felt that more was required to build up the industry, and as a result promoted legislation that would make every farmer and dairy factory responsible to the industry as a whole for their products. He proposed a system of brands to accurately identify individual contributions to export production. If a problem was discovered the Department would persuade – or if necessary

coerce – the farmer or factory manager to improve his methods. This individual accountability within the industry was the focus of the three crucial Acts passed in the 1890s.

National Archives, MAF collection

Above *The officers of the Dairy Division in 1895.*
STANDING, FROM LEFT: Messrs A. Busck (Grader), J.T. Lang (Grader), A.A. Thornton (Grader), B. Waite (Grader).
SITTING: Messrs S.M. Robbins (Grader), J.B. MacEwan (Chief Dairy Instructor), John Sawers (Dairy Instructor).



Right *By 1900 all dairy products had to be branded as New Zealand-made, by type, and with a producer registration which could include the company's name if desired.*

Annual Report, Department of Agriculture, 1900

The 1892 Dairy Industry Act established an unprecedented degree of government involvement in the industry. All cheese and butter for export to the United Kingdom had to be branded, so that its factory of origin could be traced. The dairy instructors became inspectors and were given the task of tracing sources of unhygienic butter and cheese and instructing factory managers on improvements. Should encouragement fail, the inspector could take legal proceedings against the factory. In practice the

Ruakura

The Crown Dairy Factory Company of Taranaki's Kaihihi Factory, with the company's brand superimposed.

Ruakura

Butter being graded for export.

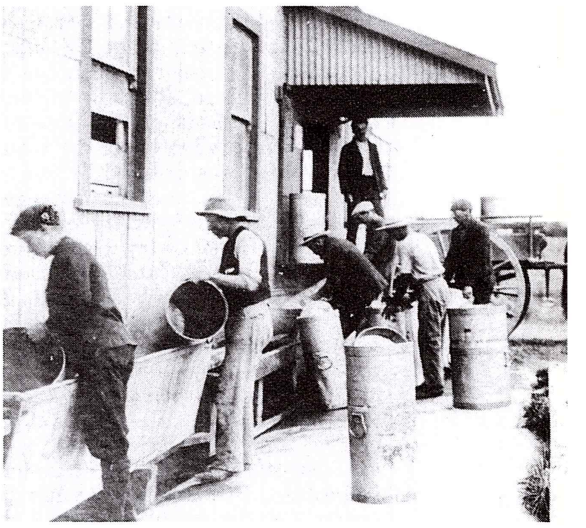
law was rarely invoked, since voluntary co-operation was usually achieved.

The dairy inspectors promoted a grading system which resulted in the Dairy Industry Act of 1894. Inspectors could now inspect farms and obtain access to the source of poor quality milk, and could also prevent the export of unhygienic butter. The provisions of the 1894 Act were implemented gradually to maintain farmer co-operation and support. G.R. Valentine, the Chief Dairy Expert, developed a grading system which created three classes of differentially-priced butter, and inspectors now attempted to encourage producers to improve the quality of their production.

The 1898 Dairy Industry Act largely completed state regulation of the industry. Under it the Government could provide cheap finance to set up dairy factories. In practice this was not really required, as banks had now adjusted their interest rates and lending policies after recognising that the co-operative principle was sound. More importantly, and again on the initiative of the inspectorate, the Government became responsible for ensuring hygienic town milk supplies.

Massey University Library

Above *While the hygiene conditions of this butter factory, circa First World War, may seem primitive, they represented an enormous improvement on conditions at the turn of the century.*



National Archives, MAF collection

Right *Basic hygiene was enforced by the inspectors. Here farmers are washing their milk cans after delivering their milk.*

International Influences on the Dairy Division

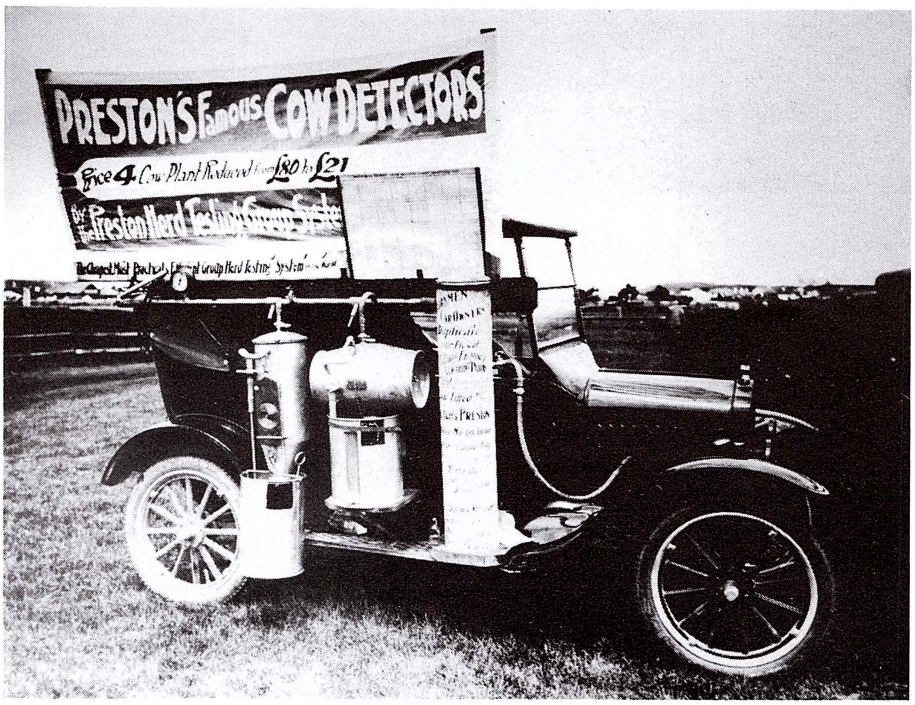
Most innovations in the dairy industry were based on developments overseas. The Dairy Division fostered international connections by employing experts from a number of countries, especially world leaders such as Canada and Denmark.

Technological developments such as milking machinery and

> The bonus of £500 offered for the first shipment of New Zealand factory-made cheese placed on the London market was gained by the New Zealand and Australian Land Company, Edendale.
>
> The first Dairy Industry Act was passed in 1892, giving powers to Inspectors, defining the terms "factory" and "creamery," making compulsory the registration of trade-marks for butter and cheese exported, and prohibiting the use of milk from diseased cows.
>
> In 1894 Mr. Valentine, who went Home to act as Produce Commissioner, sent in his resignation, and Mr. J. B. MacEwan, who was highly recommended by Professor Robertson, Canadian Dairy Commissioner, was appointed Chief Dairy Expert. In the session of 1894 an amended Dairy Industry Act was passed, and it was under this Act that the grading of dairy-produce was initiated. Graders were appointed and arrangements made for the necessary storage at the ports of Auckland, Wellington, Lyttelton, and Dunedin. In the first place butter only was dealt with, the whole output for the season, with the exception of a few tons, being graded and frozen prior to shipment. The system at first met with a good deal of opposition, but has since been universally approved, and is now admitted on all sides to have contributed greatly to the success of the dairy industry of the Dominion. During the winter of 1896 dairy schools were conducted at the Edendale and Waverley dairy factories, the use of which was granted by the respective proprietors. The attendances were very large, and the instruction had an important influence on the excellence and uniformity of the produce. During the year Mr. J. B. MacEwan, Chief Dairy Expert, resigned. In 1898, Mr. J. A. Ruddick, a highly qualified Canadian expert, was appointed Dairy Commissioner, and shortly afterwards Mr. J. A. Kinsella, also a Canadian of high qualifications, was appointed Dairy Instructor. Both these officers did valuable service to the industry. In the same year a further Dairy Industry Act was passed, under which power was taken to remove the control of the local milk-supply from the local authority, and place it in the hands of this Department. The same Act gave power to the Government to advance money for the erection and equipment of dairy factories. Although excellent work has been done under this measure in connection with dairy-inspection, little advantage has been taken of the authority to advance money for the establishment of dairy factories. The Act was amended in the session of 1898.
>
> ***AJHR*, 1909, H-29**

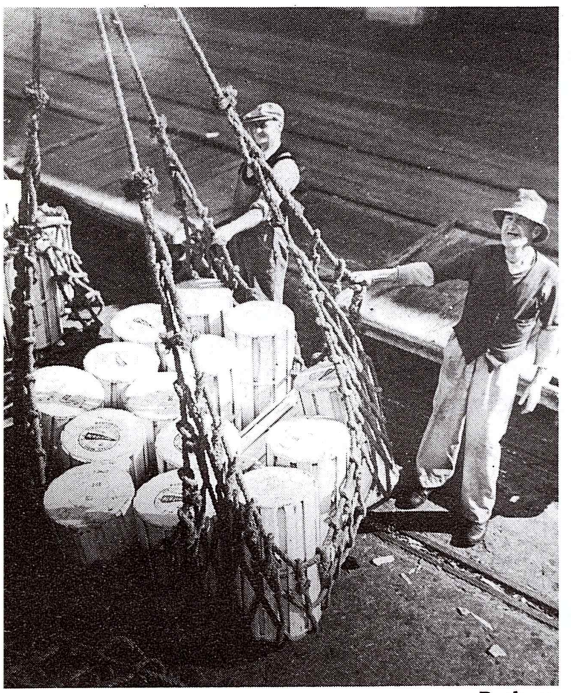
Ritchie stressed the importance to dairying of overseas experts.

refrigeration were adapted to the greater scale of New Zealand production. The Dairy Division assessed such machinery and made recommendations for its use. Some practices were at first encouraged and later made compulsory. Cream grading, for example, was introduced in 1910 but not made compulsory until 1926. Not all developments were received with enthusiasm by the Dairy Division. As we have seen, cream separators caused problems. Factory managers and the Dairy Division alike fought against separation, and relented only when it became clear that it greatly reduced the need for transport and might assist in extending dairying to less accessible areas. The use of refrigeration, better farm practices and advances in industrial chemistry also meant that older cream did not now become tainted.



Ruakura

While herd testing was developed into a unified scheme by the Dairy Division, there were private schemes available.

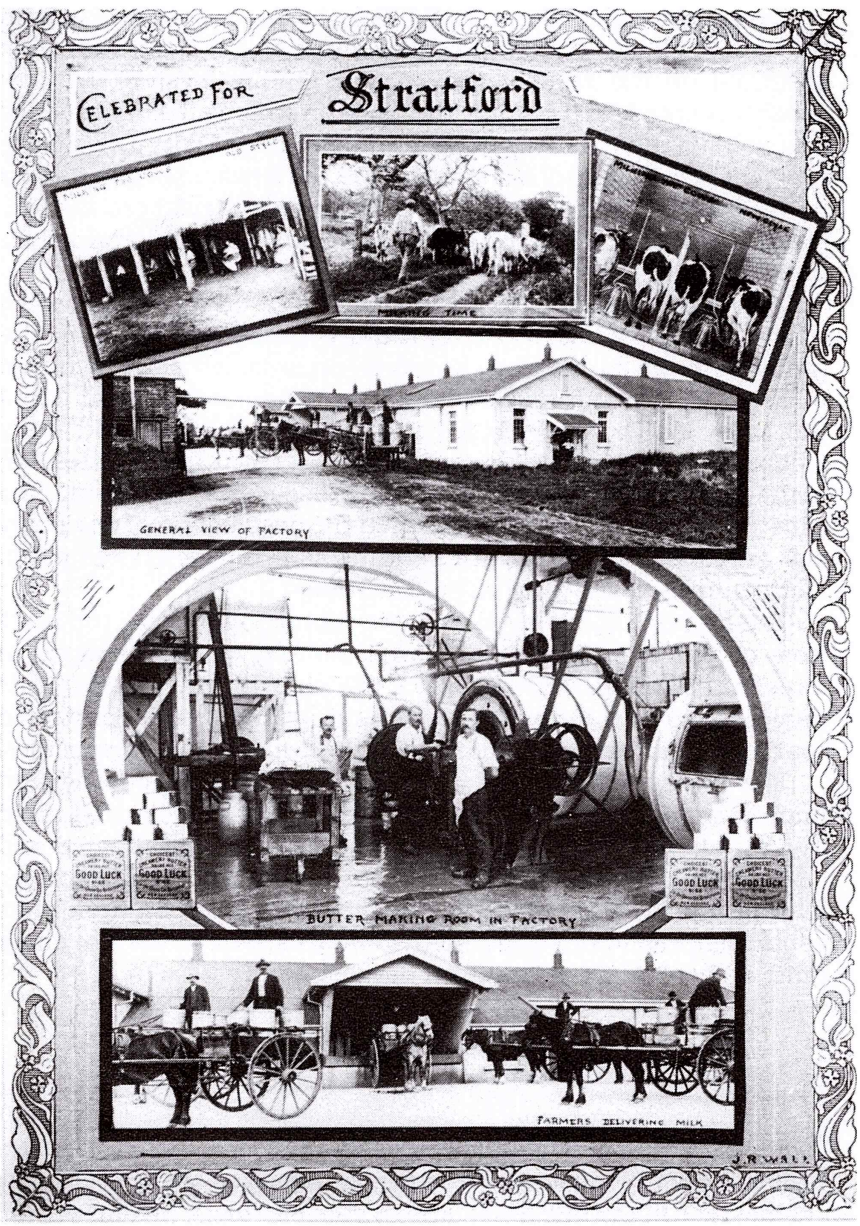


Ruakura

Left *The quality management initiated by the Department was primarily aimed at raising the standards of export dairy produce.*

Below and opposite *The rapid growth of the dairy industry was a source of pride for the Department, dairy companies and districts.*

Massey University Library



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By the start of the First World War the quality of New Zealand butter and cheese had improved so much that it now attracted a premium on the British market. The grading system, by now widely accepted, had become the basis on which all dairy produce was sold in the UK. This success inspired the Dairy Division to further encourage production. In 1909 the Division began its first herd-testing trials in an attempt to increase butterfat production. Cattle producing a high percentage of butterfat were retained for breeding, and others were culled.

The Department's responsibility for the quality of exported dairy products was only gradually extended to domestic production. Scientific work on micro-organisms had shown that milk could transmit diseases such as tuberculosis. From 1894 the Dairy Division monitored the hygiene of farms and dairy factories, greatly improving standards. J.A. Gilruth drew attention to the link between milk and a range of diseases. He experimented with the tuberculin test and ensured the destruction of obviously sick animals. Despite Gilruth's enthusiasm, bovine TB was not in fact confronted seriously until the 1960s.

The Division also played a role in protecting butter producers from competition. The 1895 Margarine Act, which remained in force until the 1970s, outlawed the sale of any oil that was processed to be sold as a butter substitute and thereby protected the dairy industry. It was enforced by the Department's inspectors.

The Division thus took a central role in maintaining and improving the quality of dairy produce, with its powers enshrined in a number of Acts. As dairy farming became consolidated and co-operatives dominant, government attention turned more to marketing. The Dairy Division remained important because of its continued role in ensuring high standards, but it was no longer quite as central to agricultural development.

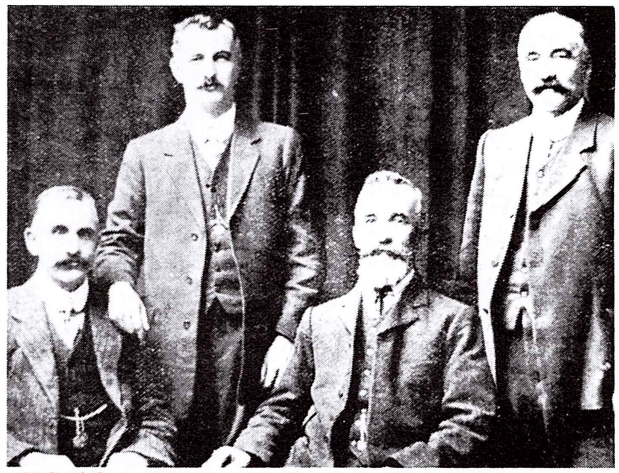
Biography

John Sawers

John Sawers was born in Wigtownshire, Scotland, on 4 February 1866. In 1881 he joined his father in managing two commercial dairies, and in 1884-85 he underwent training in dairy production. In 1885 Sawers travelled to New Zealand, where he and a brother managed the Waiareka dairy at Oamaru. In 1888 he leased and

managed a dairy factory in Ashburton, and in 1889 he was appointed Chief Dairy Expert in the Department of Crown Lands.

Sawers was transferred to the Department of Agriculture on its formation, and had a considerable influence on the infant industry. He assisted in the founding of the two dairy producer associations and in the widespread adoption of the co-operative approach. He personally introduced the first Babcock tester and strongly promoted its use. Sawers was the driving force behind the 1892 Dairy Industry Act. However, while he had sound practical experience he had limited scientific training, and in 1893 a more highly qualified Dairy Commissioner was appointed over his head. Sawers's role was soon eclipsed by the group of experts imported by the Department from 1893, and in 1895 he resigned to found and edit the journal *The Dairyman*. He served as secretary of the National Dairy Association until 1899, when he returned to dairy factory management.[7]



The Sawers brothers. FROM LEFT: George, John, William and James. John Sawers was one of four Scots brothers who emigrated to New Zealand and became involved in the infant dairy industry.

H.G. Philpott, *A History of the New Zealand Dairy Industry*

Rural Extension

Experimental Farms

Discoveries in agricultural science and the development of related technology in the second half of the nineteenth century provided

the conditions for farming to become much more productive. Breakthroughs in the understanding of disease and techniques of animal husbandry, and the development of chemical fertilisers all contributed. Yet scientists were often seen as aloof and not in contact with the real world. There was a considerable social and intellectual gulf to be bridged if New Zealand farmers were to profit from these new ideas. One of the primary aims of the Department of Agriculture was to demonstrate the importance of new techniques and make them available to all farmers. Professionals such as J.A. Gilruth and T.W. Kirk were acutely aware of this role, and their efforts initiated what was to become a comprehensive rural extension service that dominated the activities of the Department from the 1920s until the 1960s.

With the Department's formation there was a continuing lively debate within farming communities over whether it was better to set up institutions for farmers to attend or to send instructors out to farms. It was simply not possible at first for the few departmental experts to engage in much face-to-face educative work with farmers. Gilruth, Kirk and others had to get their message across in print. Both men wrote extensive annual reports which included much practical advice to farmers. These were bound in large volumes of up to 600 pages, and circulated throughout the country. Experts also produced pamphlets on areas of interest. One entitled *Milk Fever* proved so popular that a total of 25,000 were printed.[8] The veterinarians produced publications such as *Botfly in Horses*, *Swine Fever in New Zealand* and *The Treatment of Sheep for Worms*. The titles were clear, the information was in a form most farmers could understand, and they were free. In 1910 the first issue of the *Journal of Agriculture* appeared. This was a unique publication with a virtual monopoly on expertise, but it could not, on its own, satisfy farmer needs.

It was one thing to supply theoretical articles, but quite another to adapt and apply theories to New Zealand farms on which conditions were often less than ideal. Early publications, such as *The New Zealand Country Journal*, showed that farmers valued new ideas in principle, but were often confused as to which expert's advice to adopt. Theories were often contradictory, inapplicable, or just plain wrong, and could put farmers off the whole idea of science in agriculture. The priority for many struggling farmers was immediate survival rather than

National Archives, MAF collection

The Journal of Agriculture *was first published in 1910.*

experimentation with new techniques. But for all this, there was a lively and increasing demand for information, as demonstrated by the development of the *New Zealand Farmer.*

The Department, upon its formation, immediately established experimental farms in the North Island to show farmers the results of using particular methods in their own district. Most of these farms had been uneconomic holdings and were acquired at no cost from the Department of Crown Lands. The Government was unwilling to make the purchases from well-established farmers that would have been necessary to establish such farms in the South Island. In any case, there was already an agricultural college at Lincoln.

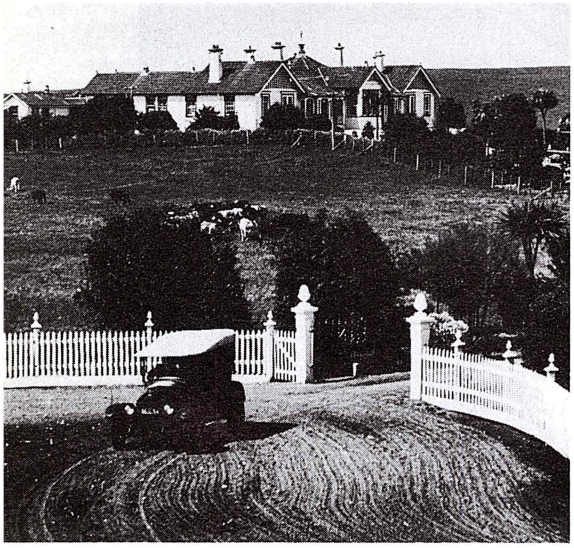
The term 'experimental' was something of a misnomer, in that there were no standard procedures for field trials at that time. Observations were not very systematic, but often valuable nevertheless. Experimental farms were sited on land under development in order to investigate how best to bring it into production. Ruakura, near Hamilton, provides a good example. This farm was bought in 1900 because its poor peat soils in swampland were typical of the area. Ruakura's successful development made it a model, and demonstrated the importance of chemical fertilisers for land development.

The Fields and Experimental Farms Division evolved out of these experimental farms. The Division was officially given form in 1907 when Edmund Clifton was made its first director.[9] He was an experienced farmer who had worked for the Stock Branch as a sheep inspector, and he became an accomplished administrator who rapidly transformed the Fields Division's work so that it became central to the Department. The promotion of artificial fertilisers, particularly superphosphate, was at the core of Clifton's ideas. He was responsible, along with A.H. Cockayne, for field trials which demonstrated the importance of phosphate fertilisers in improving pastures. This work led to the greatest innovation in pastoral farming, high-producing permanent pasture that required little or no cultivation of separate fodder crops.

New Zealand's first experimental farm was set up at Moumahaki, near Waverley, in 1893. In the same year the Department took over the Waerenga experimental farm on which the Department of Lands and Survey had been cultivating wattle trees to produce tannin for leather manufacturers. A number of other farms were soon established; by 1910 there were nine.

Ruakura

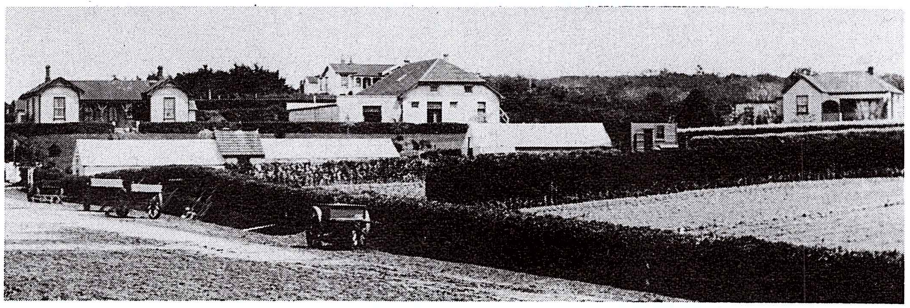
Drainage work being undertaken at Ruakura at the turn of the century. This work was the model for the development of large areas of land in the Waikato.



Ruakura

Left *Ruakura homestead about 1910.*

Below *An early picture of the Waerenga Experimental Farm – later renamed Te Kauwhata.*



Ruakura

The farms were worked as mixed farms to cover a wide range of practices, and were expected to run at a profit if possible. Not everyone approved of this thinking, and the farms came in for considerable criticism. Some dairy farmers wanted a dairy farm or dairy school, while the Dairy Division felt that the instruction/ inspection system was more effective. More importantly, there was criticism that there was no experimental farm in the South Island.

Ruakura

Above *The Fields Division put together elaborate displays of produce grown on experimental farms for A&P shows and general public display.*

Right *Numerous trials and displays of the results of superphosphate application were made to convince farmers that its use was cost-effective. This display is of potatoes grown at Ruakura.*

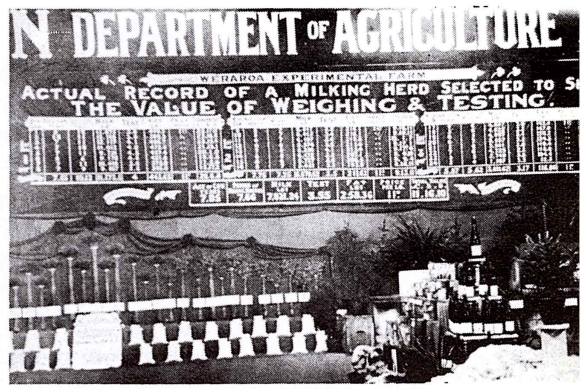
Ruakura

Ruakura

Left *New crops were trialled on the experimental farms. Here sugarbeet is being grown at Ruakura.*

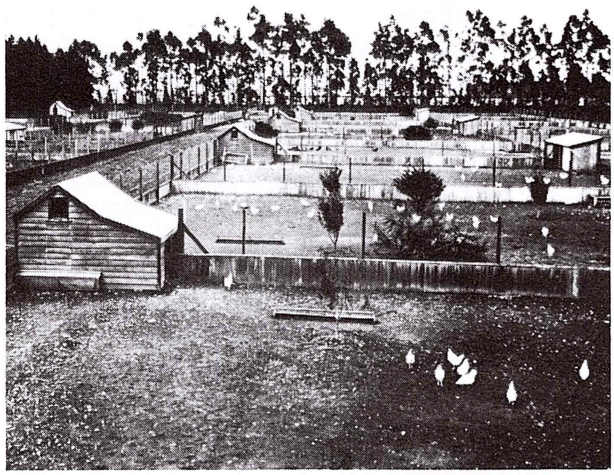
Below *Grapes grown at the Arataki experimental farm.*

Annual Report, Department of Agriculture, 1911



A display of the results of herd testing from Weraroa.

***Annual Report*, Department of Agriculture, 1911**



Ruakura

While there were no full experimental farms in the South Island, the Department did establish some trial areas. This poultry unit at Burnham was run in association with the military.

The experimental farms proved expensive to run and largely unsatisfactory for extension work. They tended to be isolated and have limited road access. As mixed farms they were of little interest to dairy farmers or those trying to make a living from recently cleared land. The work done on the farms was not always applicable even to farms nearby, and little attempt was made to publicise their findings.

Reform Makes Changes

Disquiet that the experimental farms consumed about a third of the Department's budget began to surface in the first decade of the century and became a useful weapon for W.F. Massey and the Reform Party to use in their criticisms of the Liberal Government. When in 1911 the Liberal Minister of Agriculture, Thomas Mackenzie, with the support of the Secretary, F.S. Pope, proposed to expand the experimental farms and create a system of rural extension, the Fields Division came under Opposition attack as being ineffective and too costly.[10] The Reform Government shelved any such proposals when it came into office in 1912, and closely scrutinised the Division. As a result, experimental work on farms declined and pressure was put on the farms to make money.

Massey, the new Prime Minister and Minister of Agriculture, was suspicious of his departmental advisers, all of whom had been appointed by the Liberals. He set up two new organisations in 1914, the Council and the Board of Agriculture, as alternative sources of advice. The Council was to encourage agricultural research and its practical application to farming, while the Board was to examine the Government's overall role with respect to farming. James Wilson and Edwin Hall, leading lights in the Farmers' Union, were dominant on the Board. Their clear agenda included reorganisation of the Department, and of the Fields Division in particular. The Board, understandably, soon came into conflict with the Department, to the extent that Wilson wanted to replace the Secretary for Agriculture, F.S. Pope, who had had a good working relationship with the Liberal Minister.[11] Wilson wanted a professionally trained expert in the job. Pope resented the Board and did not readily co-operate with it. The Liberal Minister of Agriculture in the wartime coalition, W.D.S. Macdonald (who was less than committed to the Board of Agriculture) left the dispute to simmer. The Board was in the end successful in toppling Pope in 1918. Dr C.J. Reakes, the Chief Veterinarian, became Director-General, while Pope became Assistant Director-General in a switch of jobs.

John Brown replaced Clifton on his retirement as Director of the Fields Division in 1916 and moved the Division away from Wellington to Weraroa, Levin, to create the Central Development Farm, an ambitious scheme that never came to fruition.[12] Brown

hoped that the farm would become a training centre for the Department's advisory staff, and eventually even a tertiary institution. But he resigned from the Department within a year, leaving the Fields Division in a demoralised state, short of staff and under investigation by the Board of Agriculture. The Division was then administered from head office jointly by A.H. Cockayne and the Director-General until Cockayne's own appointment as divisional Director in 1923.

In 1922 the Board of Agriculture produced a crucial report on the experimental farms which saw little reason to keep them unless they were of demonstrable value to the local farming community.[13] As a result, several properties, including Arataki and Tauranga, were sold. The report made it clear that farmers needed more specialised assistance from expert advisers. The Department adopted many of the report's recommendations and tried to establish a group of itinerant experts in the face of a shortage of suitably qualified people. In the short term advisers were imported, but the long-term survival of the scheme depended on the expansion of suitable tertiary education.

The Fields Instructors

With the introduction of an advisory service, the Fields Division was reinvigorated. The key to a successful advisory service was the recruitment of trained staff. Most advisers were either highly qualified generalists with degrees in agricultural science or experts recognised in their own fields. However, expertise of itself did not guarantee effective communication with sceptical farmers.

The fields instructors became a crucial ingredient in the development of farming. They had to listen carefully to both scientists and farmers, and their success depended on their credibility in the eyes of local farmers. In the process of the Fields Division taking centre-stage, departmental scientists, who believed that their role was crucial, often became marginalised.

A farm adviser's life was not easy. There was a stark contrast between the lecture hall and the world of hard-nosed farmers. The effectiveness of advisers who were on the road much of the time owed much to social skills learned on the job.

Fields instructors were also apostles of a select group advocating the 'grasslands revolution', the doctrine that in order to improve profitability farmers should plant pure grass species, fertilise

crops with phosphate, and supply nitrogen to the soil, usually by growing clover. Some advisers also certified seed, ensuring the purity of key commercially-produced grass species. The Fields Division continued to run cropping experiments throughout the country in co-operation with local farmers. This practical experience allowed general findings to be adapted to local conditions.

Early farm advisers like P.W. Smallfield and John Woodcock played key roles in the development of the advisory services. Here Smallfield writes about his early years in the Department:

> Early in 1921 I secured a position in the Department of Agriculture's Fields Division as a temporary assistant instructor in agriculture at Auckland. A year previously four instructors had been appointed and together with six or seven field instructors (the few remaining officers of Clifton's Fields Division) formed the whole of the staff of the division. There was no divisional director until 1923 when A.H. Cockayne was appointed to give leadership to the Division.
>
> Instructors appointed to the Fields Division in the early 1920s had to feel their way in organising their farm advisory work. There were three of us in the Auckland office when I joined and we covered the whole of the two Auckland land districts. T.H. Patterson, instructor in agriculture, was the senior officer. He had been appointed only a year previously and, coming from New South Wales, he was still learning Auckland farming conditions and practices. W. Dibble, fields instructor, was experienced in Auckland farming, but was retrenched later in the year (and I have long thought of his retrenchment as a typical example of government ideas of economy, for he was the only one of the three of us who was sufficiently experienced to give local farming advice). My main jobs were advising farmers on scrubland development, advocating increased use of fertilisers and lime and adequate supplementary feeding of dairy cows.[14]

John Woodcock describes his duties as a newly-appointed adviser at Taumarunui in the 1930s:

> On moving to work in the Taumarunui district I found that the grassland revolution was not yet affecting the settlers of the King Country who were still fighting a rearguard action against the encroachment of bracken fern and secondary growth, the outriders of the returning forest. They were encouraged to topdress their grassland with phosphatic fertiliser or to burn and resow reverted land, cleaning up logs and stumps in the process. By so doing, those who had Crown Leases qualified for assistance

P.W. Smallfield, *The Grasslands Revolution*

Speakers at the Ruakura Farm School, 1921.
STANDING, FROM LEFT: S. Burton, E.C. Jarrett, F.R. Callaghan, E.B. Levy, W.S. Hill, P.W. Smallfield. SITTING: T.H. Patterson, A.H. Cockayne, C.J. Reakes, J.L. Bruce, E.C. Clifton.
This photograph includes those most influential in developing farm extension from the 1900s until the 1960s. Edmund Clifton was responsible for the establishment of the Fields Division. Alfred Cockayne transformed the Division into a service dominated by travelling farm advisers, while P.W. Smallfield broadened its scope to include the support of rural families as well as production. The most illustrious of all was Bruce Levy, who went on to lead the team that isolated strains of truly perennial ryegrass and white clover.

> such as remission of rent under the terms of the Deteriorated Lands Act. It was mainly on that type of work that I was to be engaged.[15]

The role of instructors varied. In Northland advisers focused on how to grow grass on worked-over kauri-gum land, while in the South Island cropping was important. The range of skills required was considerable, and advisers could be transferred every few years. Involvement with the development of pumiceland farms one year could become advice to dairy farmers on the importance of silage and other winter feeds the next. Instructors were at once educators, practical researchers and technical advisers, and came to be held in high regard by farmers. All the Directors of the Fields Division went on to become the Department's senior administrators from the 1930s until the 1960s, and dominated internal politics in the Department.

The advisers were closely associated with the farmer, and as a result other departments made use of the service. Departmental advisers were crucial in the assessment of rent relief under the Deteriorated Lands Act of 1925 for Crown tenants on land where the initial bush-burn fertility had gone. In the 1930s advisers assisted in the administration of both mortgage and further rent relief legislation.

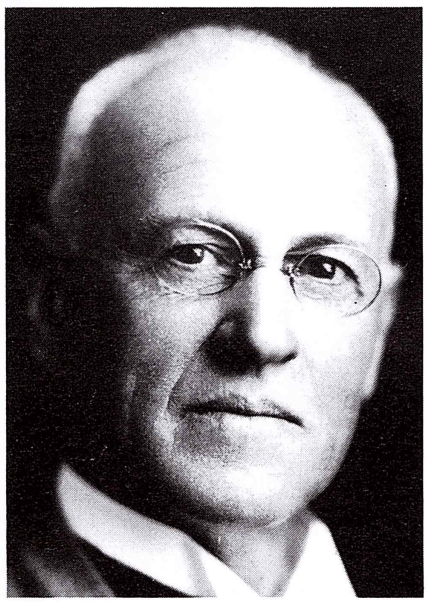
Conclusion

The Government had accepted that it had a role to play in farmer education with its first appointments of experts in the early 1880s. Successive governments found that it was not easy to reach farmers, let alone convince them to adopt new methods. The Department's initial concerted effort to achieve this by means of a system of experimental farms largely failed. The farm advisory service was much more successful and led to enormous gains in productivity through improved techniques. Its success was reflected in the rapid spread of the network at the request of farmers. By the Second World War the system covered the whole country and was sufficiently developed for the Labour Government to use it as the basis of its wartime agricultural administration.

Biographies

F.S. Pope

Frederick Stanley Pope was born in Dunedin in 1869, and educated at Ballarat College and Otago Boys High School. He entered the public service as a cadet in the Railways Department, and in 1900 transferred to the Department of Agriculture, where he was appointed as a clerk. After rapid promotion to Chief Clerk, Pope was made Acting Secretary of Agriculture in 1908, and was later confirmed in the position after reorganising the Department. Under his leadership the *Journal of Agriculture* was established in 1910. Pope also initiated a revision of the noxious weeds legislation.



National Archives, MAF collection

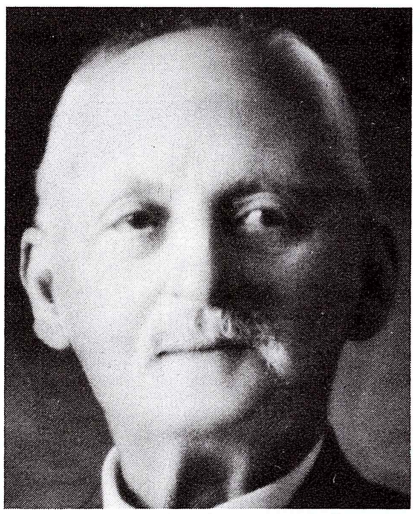
F.S. Pope.

In 1918 Dr C.J. Reakes was made Director-General of Agriculture and Pope became the Assistant Director-General. Pope did, however, remain responsible for drafting much of the legislation passed during the 1920s. He retired in 1929.[16]

Edmund Clifton

Edmund Clifton was born into a farming family in the United Kingdom in 1849. He came to New Zealand in 1872 and managed the Aohanga and Castlepoint runs.

In 1884 he joined the Stock Branch and was appointed as inspector for the problematic Amuri and Kaikoura districts. He gained a reputation by successfully eradicating scab from these areas and in



National Archives, MAF collection

Edmund Clifton.

particular from the Clarence River runs. Clifton then became Chief Livestock Officer in Auckland from 1889 to 1906. He supervised the northern experimental farms, and together with B.C. Aston oversaw crucial phosphate fertiliser trials at Ruakura. Clifton advocated the importance of winter feed for cattle and promoted the use of lucerne for making silage. In 1907 he became Chief Inspector of Stock for New Zealand and Director of the Fields Division.

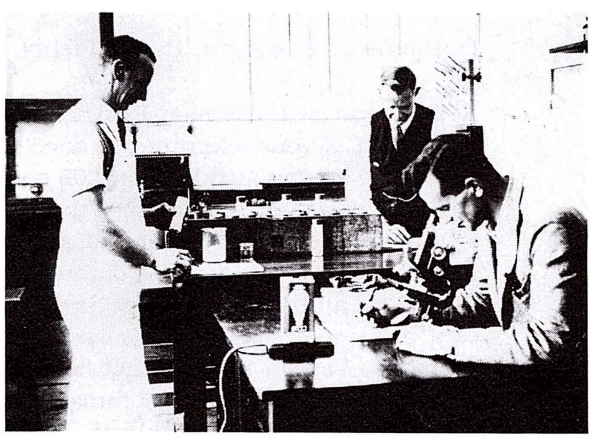
Clifton, along with A.H. Cockayne and Aston, was quick to identify the problems associated with establishing permanent pasture. He had observed the decline of bush-burn fertility and regeneration of bush some 20 years before this was fully acknowledged in the 1925 Deteriorated Lands Act. Clifton retired in 1916, and, as a result of attacks on the Fields Division, his work was left in abeyance until the Division was rejuvenated in the early 1920s.[17]

The Department and Animal Disease

Veterinarians became the largest group among the new professionals in the Department of Agriculture. They dominated the Department up to the end of the first decade of the new century and played a vital part in the fight against serious animal diseases.

The 1892 Conference of Australasian Stock Inspectors agreed to co-ordinate quarantine procedures in order to reduce the time and expense involved in bringing stock into Australasia. It also emphasised the importance of up-to-date veterinary advice. The Department quickly recruited two newly-qualified veterinarians,

J.A. Gilruth and J.R. Charlton, and the inspectors working under them were given wide powers under the Stock Act of 1893 to investigate disease, including the right to enter property, and in case of resistance to 'use all necessary force'.[18] Farmer indignation at this strong measure was allayed when automatic compensation based on the market value of healthy animals was introduced in 1898. Veterinarians became involved in a wide range of activities concerning animal disease, including diagnostic and preventive work, quarantining and meat inspection. Gilruth became Chief Veterinarian and set up the Meat Inspection Service and the Wallaceville Laboratory. By the time he resigned from the Department in 1908 he had nearly 30 veterinarians under his control and had developed a much more advanced government veterinary service than existed in Australia.



Scientists at work at Wallaceville, circa 1920s.

Ruakura

Anthrax

One area of successful preventive work was the containment and subsequent eradication of anthrax. This often fatal disease was well understood and eradicable by the 1890s. Anthrax is transmitted by the ingestion of the anthrax bacillus. Symptoms include an enlarged spleen, swollen glands, and the emission of

blood from the mouth, nose and anus. Death is often rapid. Anthrax was widespread throughout Europe, but was unknown in New Zealand until an outbreak at Ohaupo in the Waikato in 1895, by which time Pasteur had developed a vaccine. The bacterium is well able to survive outside a host; it can remain active in the soil for more than 50 years in favourable conditions. Rotting carcasses provide an excellent source of infection, with cattle and sheep picking up spores from the soil.

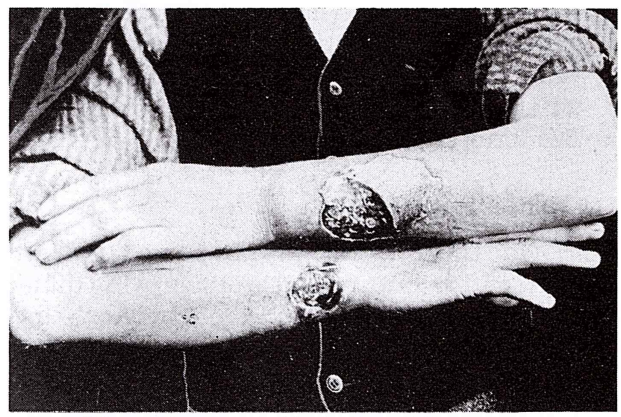
When in 1895 the Department was first notified of an outbreak, its source mystified veterinarians, although the rapid spread of the disease suggested it had originated in more than one place. Anthrax was identified in a number of locations, but the means of transmission remained unclear. The incidence of cases (including human) grew to more than ten per annum by 1903, by which time three humans had been infected, one of whom – John Fenton – had died.

Outbreak at Rangiuru, Bay of Plenty, 1900

Re the outbreak of disease at John Fenton's [farm] Rangiuru: On receipt of your telegram I at once started by boat for Tauranga, leaving Auckland at 9.00 p.m. on the 5th July, and arriving at Tauranga on the 7th at noon. Mr Seddon [a local auctioneer] met me on arrival, and from him I obtained the following particulars: The outbreak had extended over a fortnight, and during that time three cows, seven pigs, two cats, and a mare had died. He was unable to give me any symptoms beyond the fact that both pigs and mare had well-marked swelling of the throat. The mare died very quickly after showing symptoms of illness, but the pigs appeared ill for a day or two before succumbing. He assured me that three pigs were the first to die, being quickly followed by the cattle. He had been present at the opening of one of the cows, and had forwarded to you portions of the spleen and some of the glands from the neighbourhood of the throat. Enormous enlargement of the spleen had been noticed in every case by the butcher who had opened the diseased cattle.

Hearing from Mr Seddon that Mr John Fenton was in Tauranga suffering from a poisoned arm, I waited on Dr

Fookes, his medical attendant, and, after some hesitation, he informed me he was suffering from malignant pustule. I visited the patient in company with Dr Fookes on the evening of my arrival, and he then appeared in a state of collapse, constitutional symptoms having suddenly developed. He died the following morning, having been ill some five days. Dr Fookes informed me that Mr Fenton had opened the mare which died on the 2nd July, and on the



A victim of anthrax, infected after cutting open a diseased animal.

***Annual Report*, Department of Agriculture, 1903**

***Annual Report*, Department of Agriculture, 1903**

Gilruth used this photograph in his 1903 annual report to bring home to farmers the deadly nature of anthrax. This farmer died, probably after inhaling spores.

> following day had noticed a sore place on his arm. On being brought to Tauranga two days later he [the doctor] had found his arm in a very bad condition, but did not at that time suspect malignant pustule, as he was under the impression that anthrax did not exist in the colony.[19]

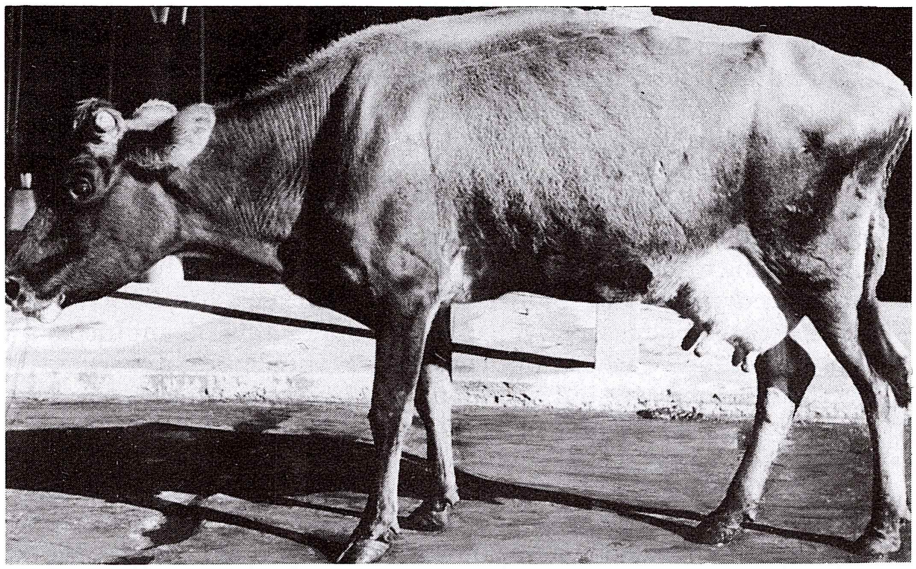
In the 1890s phosphate was obtained from bones which had supposedly been sterilised. These came largely from India, where anthrax was rampant. Gilruth suspected that this was the source, but it was to be nine years after the initial outbreaks before New Zealand inspectors were installed to ensure sterilisation at plants in Australia and India. This was an effective measure, and the problem diminished. Further outbreaks in infected areas were prevented by vaccination of stock. Isolated cases did occur in the 1950s, however, on previously infected pasture in the Waikato.

Bovine Tuberculosis

Bovine tuberculosis was not as well understood as anthrax at the turn of the century and is still proving difficult to eradicate.[20] The tubercle bacillus, discovered by Koch in 1882, creates small lesions (tubercles) in which the bacteria grow, most frequently in the lungs and/or the digestive system and lymph nodes.

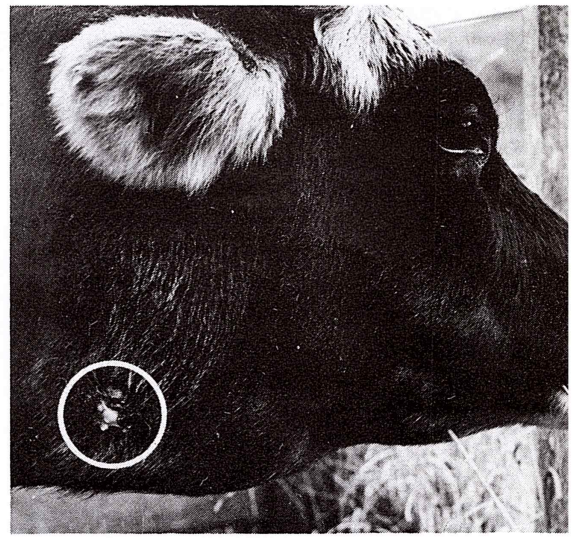
Cattle had long been observed to suffer from a wasting disease similar to human TB. However, the lesions were less likely to occur in the lungs, and hence it was less common for cattle to have the distinctive cough associated with human TB. In the 1890s, Theobald Smith demonstrated that while there was a difference between the human and the bovine forms, both were varieties of TB. After considerable debate amongst the experts it was concluded that humans were susceptible to bovine TB, which was often transmitted by cows' milk. A British commission in 1907 called for the tuberculin testing of cattle and the pasteurisation of milk.

It is possible that up to a quarter of human TB deaths around the turn of the century were due to the bovine rather than the human form of the disease.[21] While it is difficult to determine precisely how many cows had TB, it is generally accepted that the rate was about 7 per cent of the total, although this varied from region to region.[22]



National Archives, MAF collection

Above and right *Both these cows are in the advanced stages of bovine tuberculosis. The symptoms are wasting and a general decline in condition, and when the animal is near death tubercles can develop on the neck.*



National Archives, MAF collection

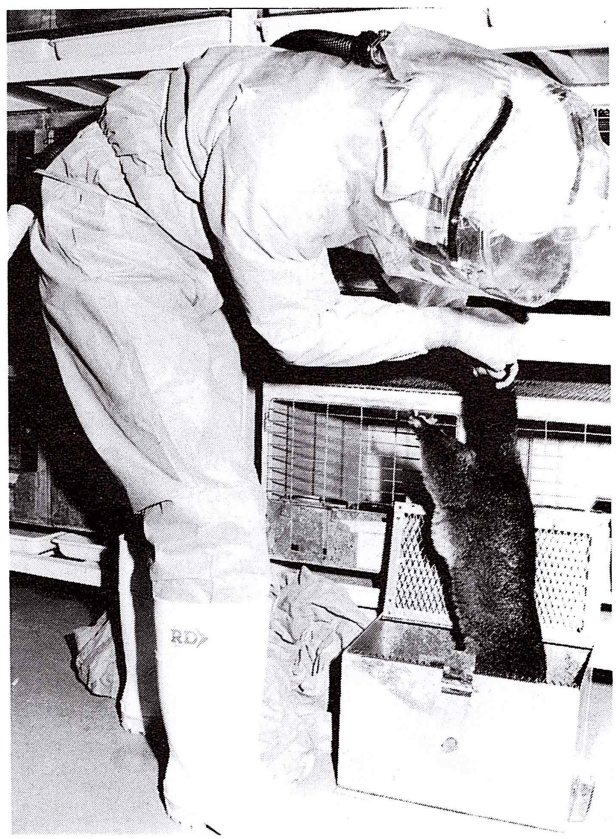
Little was done to fight this threat to public health in spite of Gilruth's and Reakes's calls for compulsory testing. Milk producers argued that pasteurisation damaged the product and consequently resisted its introduction, while consumers were relatively ignorant of its benefits. Not until 1938 did New Zealand departments co-operate in an attempt to eradicate bovine TB from town milk supplies, with a report strongly recommending testing of all town milk supply cows and the pasteurisation of milk. War intervened and nothing was done. The testing of town milk supply herds was introduced under the Statutes Amendment Act of 1945, but insufficient money was available to achieve this. Compulsory pasteurisation was introduced under the Food and Drug Regulations of 1946, but as late as 1953-54 only 61 per cent of milk consumed was pasteurised because of the long conversion period allowed for dairy factories.

The complete eradication of bovine TB was not contemplated until 1956, when all town milk supply herds had to be tested under a state-funded scheme. It was then hoped to deal with the disease within a decade. Herds producing milk for cheese and butter factories were later brought into this scheme, and beef cattle were tested compulsorily from 1977.

By the mid-1960s it had become clear that bovine TB was still a problem, especially in the Buller region where it seemed to be on the increase. In 1967 a livestock officer with the Department at Westport first identified bovine TB in possums, on a farm which had a history of continuing infection. Because at that time beef cattle were not tested compulsorily, the significance of the possums as a source of infection was uncertain. In 1970 a dairy herd only a few miles from the first farm unexpectedly became infected; a link seemed apparent. A departmental veterinarian at Westport noted that these calves had been grazed for some months in an isolated bush paddock. With another departmental veterinarian, he tested local possum populations and found a significant level of infection. Another test mob of calves became similarly infected.[23]

Possum eradication was not economically practicable, so emphasis was put on the containment of the disease. This has not been successful and the disease is continuing to spread.

The compulsory Brucellosis Eradication Scheme was begun by the Department in 1971. The disease, which leads to abortion

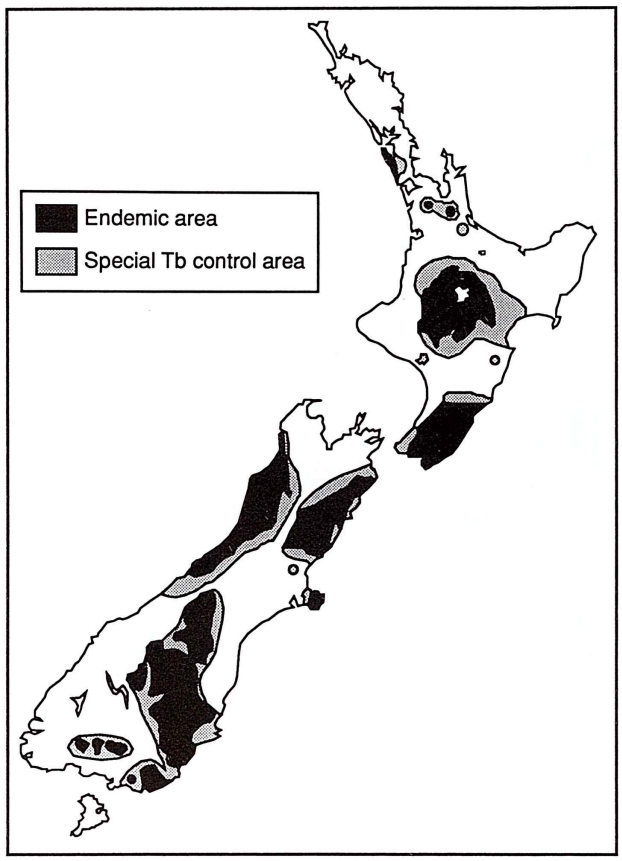


Bovine tuberculosis can be contracted by humans. This Wallaceville researcher wears protective clothing to avoid catching the disease.

Wallaceville

in cows, is caused by the *Brucella abortis* organism. In 1971 5 per cent of dairy cows and 15 per cent of cows in beef herds were infected. There was some infection in 14,400 herds – more than a third of all herds.

Movement control (quarantine) for herds with a history of brucellosis was introduced in November 1979. Some 611 herds were soon controlled. By the end of 1989 all controls had been lifted because it was considered that effective eradication had been achieved.[24]



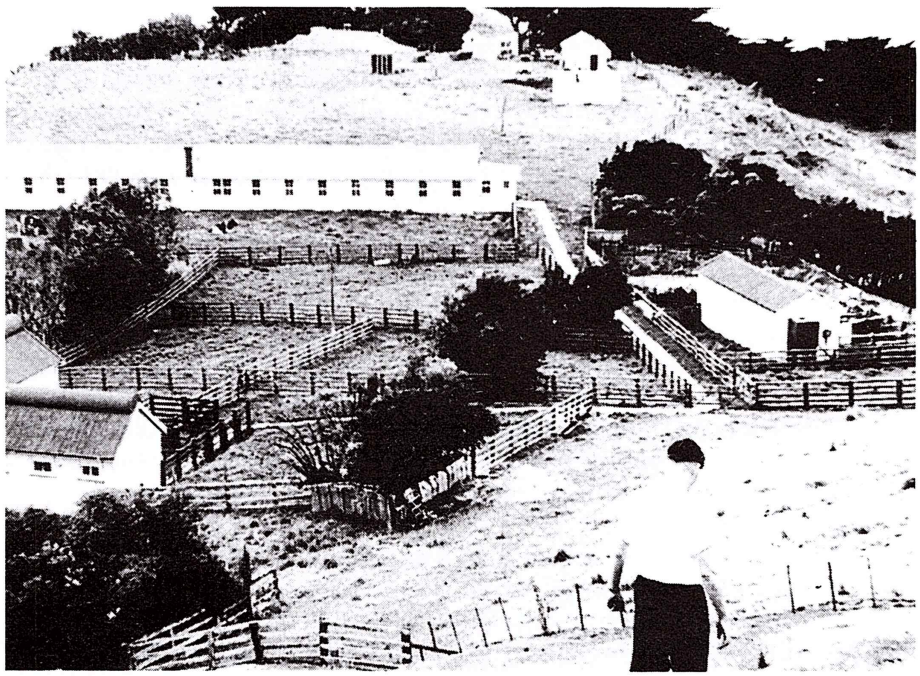
Left *Bovine tuberculosis is endemic in some areas. Herd testing and movement control of cattle reduce the spread of the disease, but controlling the main vector, the possum, has proved more difficult.*

Opposite *Looking northward on Somes Island in 1959.*

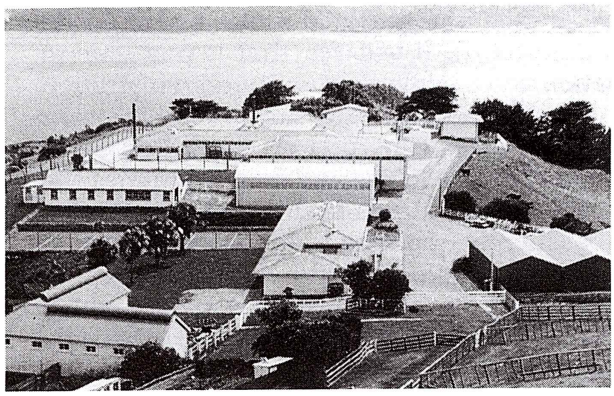
The Quarantine System

The first legislation to give the colonial Government power to quarantine imported stock was passed in 1861. The Diseased Cattle Act provided for inspectors to examine imported cattle and gave the power to set up quarantine areas if necessary. The first permanent quarantine stations were proclaimed in 1889 under the 1881 Diseased Cattle Act. Stations were set up on Motuihi Island in the Hauraki Gulf, Quail Island near Lyttelton, and Somes Island in Wellington harbour.

By 1890 the Stock Branch administered a number of Cattle and Sheep Acts (see Chapter 1). It was felt that it was time to consolidate this legislation into a single statute. The administration of quarantine regulations had become unwieldy and the process prolonged.[25] A conference of all relevant Australasian officials was held in Wellington in October 1892. The aim was to improve the co-ordination of quarantine procedures and lessen delays. The two veterinarians subsequently appointed to the Department of Agriculture became crucial to the stricter administration of quarantine made possible by the 1893 Stock Act, under which quarantine was made mandatory. In 1908 Somes Island became the primary quarantine station; it has remained so ever since. Its facilities have been upgraded regularly and it was largely rebuilt in the late 1960s as a maximum security quarantine station. Stock from countries previously denied entry to New Zealand could now be imported.



Alexander Turnbull Library



S.G. Butcher

The Somes Island quarantine station in 1989.

Meat Inspection

Animal disease is of concern to the consumer as well as the farmer. Illness caused by food poisoning related to diseased animals was a problem at the turn of the century. The Government wished to protect consumers and enhance New Zealand's reputation as an exporter by ensuring high standards of hygiene. A comprehensive system of meat inspection was introduced in stages. Government inspectors, mostly veterinarians, certified meat as hygienic.

With the discovery of bacteria and improved understanding of the nature of disease, hygiene became a crucial consideration in meat processing industries. The United States appears to have initiated government meat inspection when federal authorities took on the inspection of all export pork in the early 1890s. American companies proved unable to rid meat of the trichinella cyst, and a number of European countries banned imports during the 1880s.[26] From this time on many governments became increasingly involved in meat hygiene, with New Zealand at the forefront.[27]

The early involvement of the Department of Agriculture arose partly from its success with the dairy industry but more importantly because of the dominant position of the veterinarians, and in particular Gilruth. He cleverly orchestrated a campaign advocating meat inspection, speaking on the issue, supplying written material

to the public, and writing voluminous annual reports which condemned the poor standard of New Zealand's meat, particularly that killed for domestic consumption. Gilruth described the Invercargill City Abattoirs:

> At the present time drainage does not practically exist for the majority of these premises, pigs taking on the functions of scavengers of the blood and offal; and the water-supply

Ruakura

While this slaughterhouse was not as bad as the one described by Gilruth, it leaves a lot to be desired by modern standards.

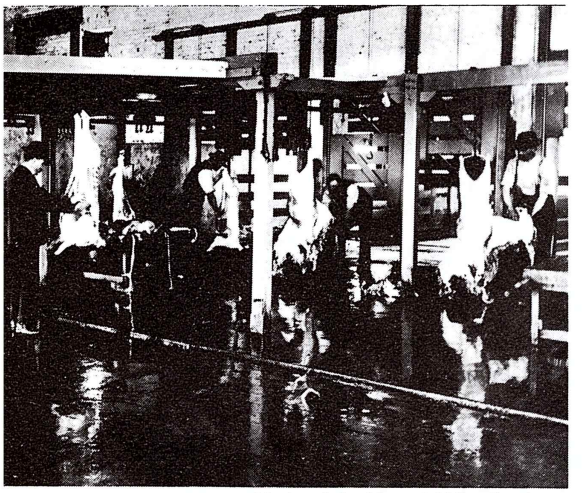
> is of the most limited description, derived partly from the roofs, but chiefly from shallow wells dug as near as possible to the slaughter-shed for convenience. These wells are in several instances little else than cesspools, their contents being chiefly filterings from the contiguous fetid quagmires. As a result of the comparative scarcity of the water the cleanliness of the buildings is not attended to, and it appeared to me in some instances that the supply was even insufficient to cleanse the instruments used in the establishment. Again, the wooden floors and walls are saturated with the accumulated blood of years, while nearly every building bears distinct evidences of being utilised by birds for shelter. On the whole, the conditions under which meat is dressed prior to being exposed for sale in Invercargill are about as deplorable as could well be imagined, while, of course, the public have not the guarantee, which can only be given by official inspection, that their meat-supply is fit for human consumption.[28]

This campaign created an enormous political debate centring on three issues. Should the Government get involved in the meat industry? Should legislation be applied to abattoirs only, or extended to export meatworks? Should small city butchers be permitted to continue to slaughter? In general, urban members of the House supported an Act on public health grounds, while rural members and those involved with freezing companies argued that it should not cover export slaughterhouses, which they argued had higher standards of hygiene than local-market abattoirs. While some urban members championed the rights of the small butcher, in general Liberal MPs fell in behind the party line on the issue, which was to support comprehensive meat inspection. The Slaughtering and Inspection Act, passed in October 1900, provided for the inspection of all stock by departmental veterinarians and inspectors before and after slaughter.[29]

THE HONORABLE JOCK AS A SOCIAL PEST CRUSHER.

THE McKENZIE: It's not a man I'm crushing. It's only a small butcher, who sells rotten meat, and what is he after all but a cannibal and another social pest.

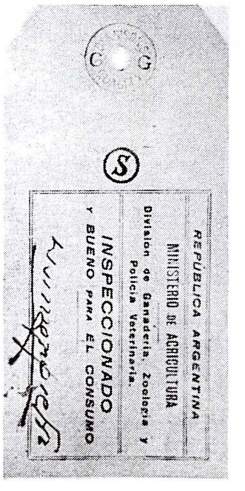
National Archives, Seddon scrapbooks



National Archives, MAF collection

Left *A meat inspector at work shortly after the scheme's introduction.*

Below *By the early twentieth century all major exporters to the United Kingdom supplied government-certified meat. This meat was accompanied by inspection labels like these from Argentina, New Zealand and Queensland.*



Critchell and Raymond, *A History of The Frozen Meat Trade*

Biography

J.A. Gilruth

Wallaceville

J.A. Gilruth.

John Anderson Gilruth was born on 17 February 1871 at Auchmithie, Forfarshire, Scotland. His family were tenant farmers. After a brief and unhappy period as a lawyer's clerk, he studied veterinary science in Glasgow and London. The top graduate in his year, he was recruited by the New Zealand Government at the age of 22 to be veterinarian for the newly formed Department of Agriculture.

Gilruth arrived in New Zealand in August 1893 and set about investigating stock disease. He was the first and most prolific publisher of pamphlets and articles in the Department. In 1896 the Government sent him to Paris to study for a year at the Pasteur Institute. On his return he was promoted to Chief Veterinarian. He immediately advocated a comprehensive system of meat inspection, which was introduced between 1898 and 1900. Gilruth became head of a section eventually employing about 30 veterinarians, and he was instrumental in establishing effective techniques for disease control and surveillance. He also lobbied for the creation of a separate laboratory and farm, which was achieved in 1905 with the setting up of the Wallaceville Laboratory.

In 1906 the South African Government offered Gilruth, through Premier R.J. Seddon, a comparable position at twice his salary. Seddon, keen to retain Gilruth's services, did not pass on the offer, and Gilruth resigned in 1908 upon learning of this.

Gilruth was offered the first chair of veterinary pathology at the University of Melbourne. In 1909 he was awarded an honorary doctorate. In 1911 he served on a government commission which

recommended a policy of active development for the Northern Territory. Gilruth became the Territory's Administrator and implemented this policy. A Commission of Inquiry in 1920, however, controversially damned his administration and he was removed from office, returning to veterinary medicine as a consultant. In 1930 he became acting chief of the animal health section of the Council for Scientific and Industrial Research, a position to which he was appointed permanently in 1933.

An inspired researcher, Gilruth was much sought after as a member of review committees and supervisory organisations. He was elected president of the Australian Veterinary Association in 1933 and made a life member in 1936. He retired in 1935 and died suddenly in 1937. His name is commemorated in Australia by Gilruth Plains, a research station in Queensland, and by the Gilruth research prize offered by the Australian Veterinary Association. There is a Gilruth Avenue in Darwin.[30]

Control of Plants

T.W. Kirk was keen to put restrictions on imports of plant material to New Zealand. In the *Annual Report* of 1895 he noted that weeds and plant diseases were coming in virtually without control.

> At the present time our ports are open for the introduction of every abomination, with the single exception of codlin moth, in the shape of weeds, and insect and fungus pests, which any unpatriotic colonist chooses to import – risking, for the sake of a small present profit, the future well-being not of himself only, but also the very existence of important industries and the people dependent thereon.[31]

Kirk advocated close supervision at ports and the careful examination of all imported plants and fruit at the importers' expense. Contaminated material was to be fumigated, destroyed or reshipped, along with its packing materials.

Legislation to prohibit the introduction of the vine parasite phylloxera was introduced into Parliament in 1895, but lapsed for lack of time. Wider control of pests was crucial to the development of orcharding, and had been central to the agenda of fruitgrower associations since the 1880s.[32] After an international conference of fruitgrowers in Wellington in May 1895, the Department drafted and circulated more comprehensive legislation. While

everyone could agree on restricting imports, proposals to restrict the movement and sale of infected fruit within the country were controversial. Auckland growers, who already had to cope with codlin moth and phylloxera, opposed any internal restrictions and such aspects were dropped from the resulting Orchard and Garden Pests Act of 1896.

This Act gave the Government powers to inspect imported fruit for pests and reject any imported plant material that might spread disease. The major pests identified in the subsequent regulations of 1897 included phylloxera, codlin moth, Queensland fruit fly and scale insects. Government could extend the scope of the Act by regulation, and this was done regularly on the recommendation of the Department. New Zealand now rigorously controlled imports. Inspectors were appointed at each of the four main ports, and provided with fumigation sheds to minimise the material that had to be destroyed or reshipped.

There was still no check on the spread of a disease or pest once it had entered the country. Kirk pushed for further legislation, but again Auckland and also Nelson fruitgrowers campaigned successfully against this. Growers did not see why they should be penalised when they had not introduced pests which had already caused them considerable losses. Meanwhile phylloxera and codlin moth continued to spread and by the 1900s virtually the whole country was affected. Kirk finally got another Orchard and Garden Pests Act passed in 1903, although this was of limited value against well-established pests. The Department could now inspect local fruit and contain any major outbreaks of disease. Three inspectors were immediately appointed. Their powers were used judiciously and usually only against economically significant pests which growers generally agreed needed to be tackled.

Things did not always go smoothly. In 1907 a large consignment of fruit containing Mediterranean fruit-fly maggots was distributed from Auckland. The shipment was recalled, but not before a small proportion of it had been sold. There were outbreaks of fruit fly in Napier and Blenheim, but quick action, including the spraying of all infected areas, led to its eradication.

Politicians soon discovered that politically motivated restrictions could be legitimated by the need for quarantine. New Zealand and Australia became involved in a lively trade rivalry between the two world wars.[33] While superficially the issue was

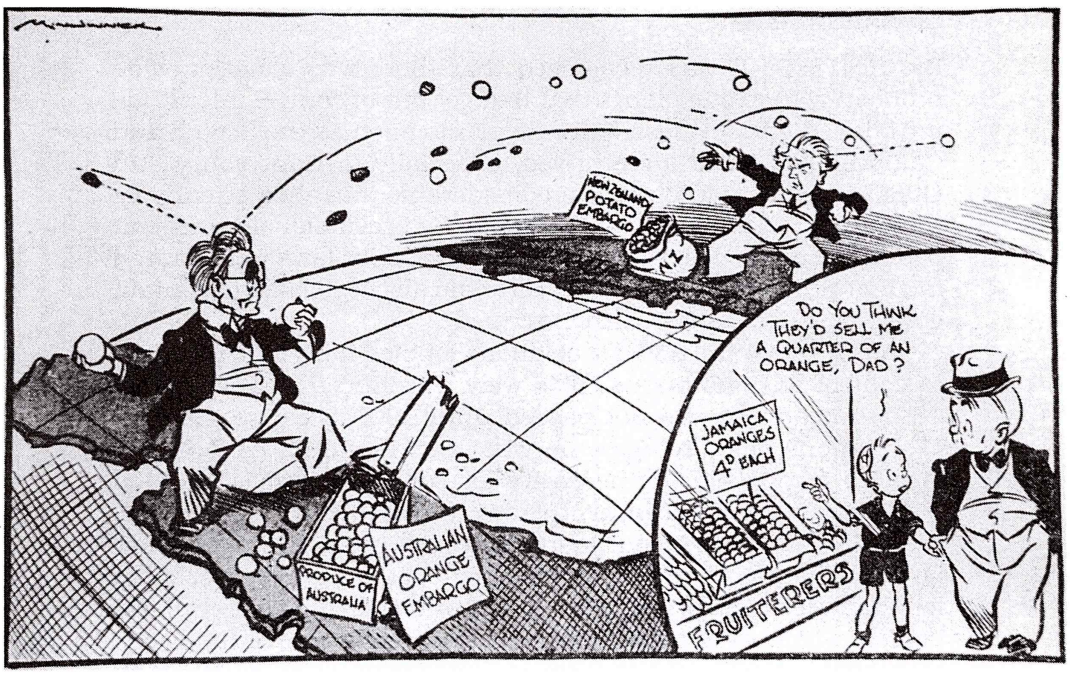
the risk of introduction of plant disease, this was really a symptom of tense trade relations between two countries which exported similar products.

After the First World War the Australian economy was more highly protected than New Zealand's and New Zealand was being gradually squeezed out, particularly in agricultural products. In 1919 a consignment of New Zealand potatoes was found to be infected with powdery scab. The disease was of no great economic significance, but Australian customs officials used it as a reason to ban all potato imports from New Zealand. In the same year Australia banned imports of most New Zealand fruits and plants because of an outbreak of fireblight in New Zealand, and this ban remained in place during the 1920s. This caused little public concern, but Cockayne questioned the ban's validity, arguing that the disease could not actually be spread through ripe fruit. Australia raised the ante in 1921 when it placed New Zealand on the same tariff as non-traditional trading partners such as Asian countries. New Zealand responded by putting Australia on its own 'least-favourable' list. An uneasy truce on tariff issues was negotiated in 1922.

The 1920s was thus a period of considerable difficulty for New Zealand's pip-fruit exporters. The United States would not accept New Zealand fruit because New Zealand itself imported fruit from Australia, which had fruit fly. As the world went into depression, many countries, including Australia and the United States, further restricted trade. In a retaliatory move in late 1932 New Zealand banned all Australian fruit and vegetables, ostensibly because of fruit fly. It was hoped that this drastic move would precipitate change and lead to easier access to the Commonwealth for New Zealand goods, but the bans remained in place.

While Australian protection was reduced in some areas, the ban on New Zealand potatoes remained in effect until after the Second World War, and continued to cause unease in the trans-Tasman relationship. Scientists agreed that there need be no barriers to trade, but the politicians, by their own rhetoric, had become entrenched in their positions.

The boom in air travel which followed the Second World War posed considerable problems for quarantine and border authorities. In 1949 a symposium of the Seventh Pan-Pacific



New Zealand Herald, **Minhinnick**

New Zealand/Australian trade relations were strained between the two world wars, with tit-for-tat trade restrictions which included dubious bans on the importation of New Zealand potatoes and Australian oranges.

Science Congress in Wellington was devoted to plant quarantine. The Government responded with tighter regulations and the construction of advanced pressurised fumigation stations in Auckland, Wellington and Christchurch.

Animal and plant control was enhanced in the early 1960s by the amalgamation of the Department's animal and plant quarantine inspectorates to form the Port Agriculture Service. This service is currently under the Quality Management Group, which has overall responsibility for import services and meat inspection.[34]

Noxious Weeds

By the 1890s it was recognised that there was a nation-wide problem with exotic plants that had got out of control. Alongside introduced grasses, less welcome plants such as the Scotch and Californian thistles also thrived, especially in Canterbury and Otago. Thistles had become a considerable nuisance as early as the 1850s, and in 1854 Wellington's provincial government passed an act to deal with the problem. Similar laws were passed in other provinces. Nelson and Taranaki also legislated to contain gorse, or 'furze' as it was then termed.[35]

In the 1890s the A&P associations lobbied hard for legislation to control noxious plants. Bills were introduced annually from 1892 but an Act was not passed until 1900 because the A&P associations failed to agree on what was required. While many farmers recognised the necessity for control of weeds such as blackberry and sweet briar, they were nonetheless reluctant to see still more government inspectors with powers to enter their land and interfere with the management of their properties. Many felt that weed control would be carried out more effectively by local bodies, which were considered to be more sensitive to the needs of farmers. North Island farmers and Maori were particularly concerned about the application of any legislation to Maori land, while many in the south thought that the Crown should set an example by removing weeds from its own lands.

Departmental experts now proposed a system that would give county councils powers equivalent to those of rabbit boards. If a council proved inadequate, the Department could intervene. This proposal was put forward at the A&P associations' 1900 conference and was passed by a single vote, probably only because non-members, presumably departmental officers, had been given the right to vote. The resulting bill was generally well received and, after minor amendments by the Stock Select Committee, the Noxious Weeds Act was passed that year.

While local bodies administered the Act for the most part, the Department of Agriculture took responsibility for Crown lands and Maori land in communal title. The noxious weeds listed in the first schedule – blackberry, Californian or Canadian thistle and sweet briar – were to be destroyed wherever found, while those in the second schedule were deemed noxious only if the county or borough council declared them so.

This Act has remained the basis for the control of noxious weeds ever since. By 1930 councils could declare all or none of the scheduled weeds on their lands noxious. Landowners could now appeal against the judgement of the inspectors, and councils were given the freedom to borrow money for weed control without conducting a poll of ratepayers.

The noxious weeds legislation was much criticised. Its premise that the mere presence of a noxious weed was unacceptable proved an impossible goal to enforce. Control officers had to decide what was acceptable, leading to inconsistency between areas and a lack of accountability.

One plant was treated as a special case. Nassella tussock – of Argentinian origin and found mainly in Canterbury and Marlborough – was not nutritious to stock and was aggressively displacing native tussocks.[36] The plant may have been imported in wool bales or fleeces around the turn of the century. It was first noticed by the Christchurch Fields Superintendent, R. McGillivray, in 1928, although it was not positively identified until 1934. By the 1940s it dominated tussock land in the Waipara area of North Canterbury, and proved hard to eradicate by conventional means such as grubbing. Under the Nassella Tussock Act of 1946, two centrally funded boards were set up to control it by spraying. This proved effective, and by the 1980s the problem had become one of containment.

Under the Noxious Plants Act of 1978 a co-ordinating Noxious Plants Council was formed with district authorities and the two Nassella Tussock Boards under it. The Act gave the responsibility for the eradication of serious noxious plants to the Ministry, while local authorities dealt with those of lesser concern.

Under the 1991 Resource Management Act, regional government now has the primary responsibility for weeds and pests. It is currently proposed to bring plant, animal and wildlife legislation together into one Act. The Biosecurity Bill is expected to be introduced in 1992.

The Establishment of an Export Fruit Industry

In 1893 the Department employed two fruit instructors to advise orchardists in the then major fruit-growing areas, Auckland and Christchurch. The latest overseas information on techniques such as grafting and propagation and sprays was made available,

and experiments to adapt these to local conditions were undertaken. In 1900 the Department leased two orchards in Auckland so that experiments could be conducted under controlled conditions. The two instructors were soon joined by horticultural inspectors appointed under the Orchard and Garden Pests Act of 1903. While the inspectors' main task was to enforce the law, they also provided instruction on pest containment and sound orcharding techniques. By 1910-11 there were seven horticultural inspectors and 13 orchard instructors, who were based in Auckland and Christchurch and other developing areas such as the Moutere, Hawke's Bay and Central Otago.

T.E. Rodda described his work as an orchard instructor:

National Archives, MAF collection

A fruit instructor giving an apple-packing demonstration at an orchard at Stoke, near Nelson, in 1912.

There was a fair acreage of old orchards in Waikato, Waipa, Tauranga and Opotiki centres in 1912. The early settlers appear to have been keen on fruit tree planting, but they did practically nothing to control pests. Codlin moth was extremely bad and mussel scale was rampant, owing to the vast mileage of hawthorn shelter fences planted by the early settlers. Around Te Awamutu and Pirongia were many old orchards planted by the early military settlers and later on abandoned. As no owners could be traced I had to arrange for their destruction. Quite a large number of owners were prosecuted and fined during 1912 and 1913, and thereafter many owners destroyed their trees after receiving a final warning.[37]

Alexander Turnbull Library

A view of Nelson apple orchards about 1920.

The Department also assisted the industry by guaranteeing profits. From 1897 exporters of apples to the United Kingdom were guaranteed a profit of 1d per lb. This was followed by a number of other guarantees between 1908 and 1939. While these were called upon only infrequently, they were important in fostering a sense of security in the developing export industry. Guarantees were removed only when the Government itself took over the marketing of apples during the Second World War.

The Fruit-preserving Industry Act of 1913 followed the 1898 Dairy Industry Act in offering cheap credit for the construction of cool stores and processing plants. While not taken advantage of extensively, this Act was another sign of government support for the expansion of the industry.

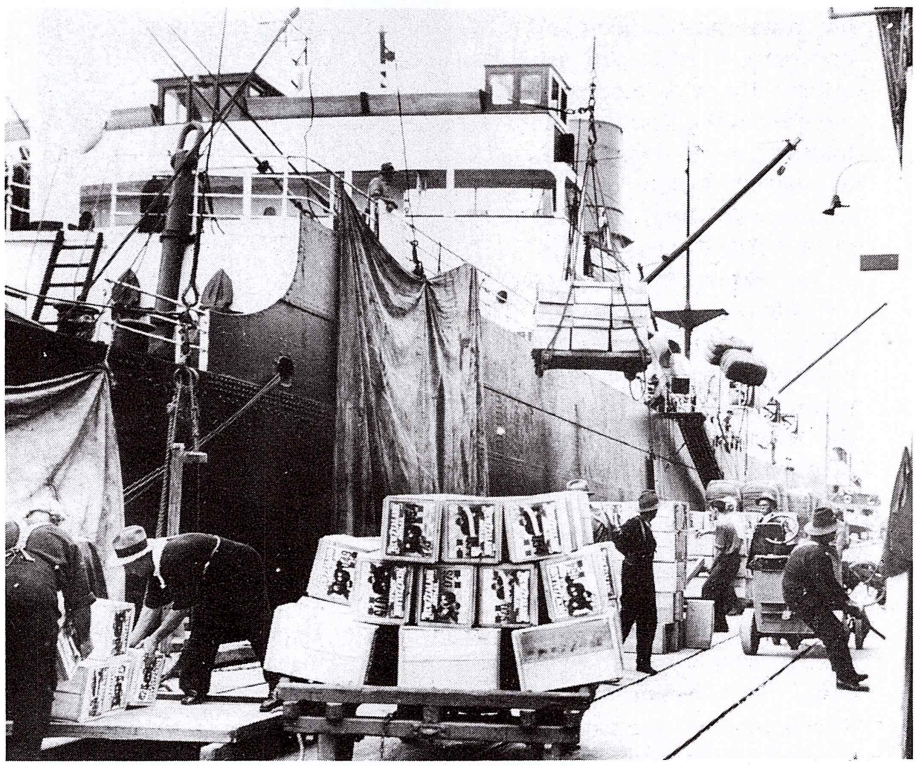
The Government was also keen to encourage the creation of producer bodies, and took the initiative by organising the formation of the Fruitgrowers' Federation in 1916. The Federation was funded by a compulsory levy on orchardists under the Orchard-tax Act of 1916. Such legislative and administrative support remained crucial to the Federation's existence until 1953, when that organisation itself took over collection of the levy.

The fruitgrowing industry responded well to government assistance. Apple plantings increased dramatically in the period 1910-14 and immediately after the war. By the mid-1920s New

Ruakura

Apples being trained along wires.

Zealand had established a stable pip-fruit industry earning more than £100,000 per annum from exports.



Ruakura

The Department's main focus in horticulture was the development of an apple export industry.

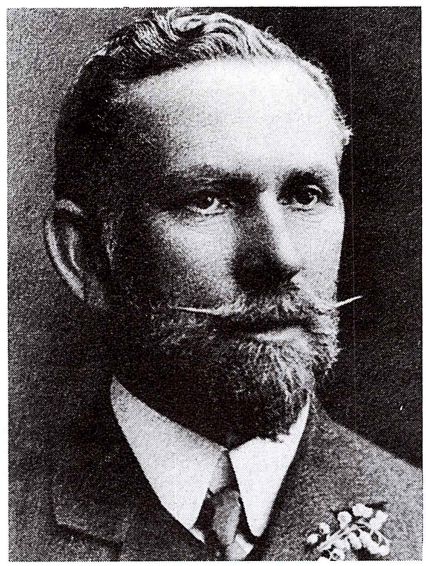
Biography

T.W. Kirk

Thomas William Kirk was born in Coventry, England in 1856 and emigrated with his family to Auckland in 1863. His father, Thomas Kirk, was a renowned botanist who served as New Zealand's Conservator of Forests from 1885 to 1888. His brother, H.B. Kirk, was the

founding Professor of Biology at Victoria University College. In 1874 T.W. Kirk joined the Geological Survey, where he worked for 17 years, writing numerous papers and becoming a respected scientist. He was elected a member of the New Zealand Institute in 1878 and of the Geological Society of Australasia in 1887, and became a fellow of the Linnaean Society in 1890.

Kirk's career changed direction in 1893 when he began work as a biologist on plant disease and pests in the newly formed Department of Agriculture. He was particularly concerned about New Zealand's lack of border protection and promoted the passage of the Orchard and Garden Pests Act 1896, followed in 1903 by an extension of the Act giving the Department powers to control pests within the country. In 1909 Kirk became Director of the Orchards, Gardens and Apiaries Division, with a brief to aid the development of an export pip-fruit industry. Kirk was personally associated with the development of orcharding in the Moutere Hills district near Motueka, where he himself bought an orchard. He became the first New Zealand botanist to use biological control techniques on insect pests when he successfully introduced the Australian ladybird to control cottony cushion scale. He retired in 1921 and died on 19 May 1936.[38]



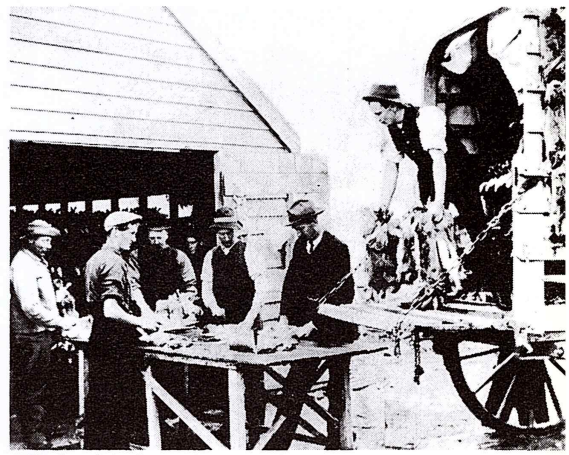
National Archives, MAF collection

T.W. Kirk.

Control of Rabbits

By the late nineteenth century rabbits had proved themselves adept and hardy settlers that thrived under a wide range of conditions. They made an obvious and immediate impact on stocking rates, but the hidden longer-term cost was degradation

of the land. Future production and even the land itself was threatened by the rabbit.



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Right and below *The trade in rabbit meat and fur was controversial. Some argued that it encouraged landholders to 'farm' rabbits, while others noted that more rabbits were killed by commercial hunters than by inspectors and rabbit boards.*

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Rabbit skins being sorted for export.

Destruction of the rabbit was complicated by the emergence of a canning and frozen meat industry in the south in the 1890s. As many as 20 million skins were exported in 1924. Demand for meat and fur was responsible for containment of the pest in the short term, but did not decrease numbers in the long run.

Rabbits and the Department of Agriculture

The Department of Agriculture on its formation took over administration of the 1886 Rabbit Nuisance Act. Rabbit control was expensive and consumed a major proportion of the Department's annual budget, more than a quarter in 1895-96 for example.[39] It attempted to monitor populations through personal observations by rabbit inspectors, but these were not accurate enough for the allocation of funding to areas of need. In practice, the amount of money spent on eradication was determined by the local rabbit board's ability to raise a rate.

Between 1883 and 1897 the Government introduced natural enemies of the rabbit, including stoats, weasels and ferrets, in

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Right *Rabbiters became a feature of country life.*

Below *Rabbiters used a range of techniques to kill the pest, including shooting and poisoning. Pictured here are the results of a rabbit drive and shoot.*

National Archives, MAF collection

an attempt to control numbers.[40] These predators had some effect, but unfortunately their major impact was on bird populations.

Until 1920 there were not many rabbit boards, because these had to have authority over a minimum of 200,000 acres under the Act, and they did not seem very successful. Rabbit inspectors had to grapple with the problem largely on their own.

Rabbiters used various eradication methods, such as poisoning, fumigation of warrens and shooting. Poisons included phosphorus, arsenic and strychnine, and were often rotated when rabbits became bait-shy. Poisoning was an art and preparation was complex.

> Place 60 lbs of oats in a revolving machine, add 1½ gal of boiling water in which 4 lb of sugar and ½ lb of phosphorus has been dissolved. Add as quickly as possible another 2 gal of boiling water. Close lid and revolve for half an hour. Wait four hours before turning for another 10 minutes, leave for 24 hours. Check to see if fumes have dissipated, turn for a few minutes and then remove grain. Use before 48 hours have passed. Salt can be used at 1½ lb per 60 lb of grain.[41]

After 1920, although the number of boards increased, they were still largely unsuccessful. This failure was blamed on poor administration, inadequate finance or incompetent rabbiters. Little or no effort was made to study the rabbit populations to understand why they were not declining.

Rabbit control was never a popular duty for inspectors. Some were also inspectors of livestock, and found that their rabbit work damaged their relationships with farmers. Most rabbit inspectors had a lower status than livestock inspectors. Their calibre varied, but they were fairly rough by public service standards, as this letter written by a rabbit inspector to a farmer about 1900 reveals:

> I was down your road last week and I seen a Hell of a lot of rabbits in them mine tailings behind your house and no work going on to keep them the neighbours tell me that

> you was down in the pub and that you was drunk for four days last Christmas and you haven't done a dam thing about them rabbits since last time I stirred you up they tell me you are saving them up so as to have a few bob to go to the Show and probably get drunk again for another four days.
>
> NOW THEREFORE TAKE NOTICE that me being an inspector under the said act hereto require you to forthwith commence rabbit destruction work immediately in default of which you'll go to Gaol which will probably be a bloody good thing as far as your concerned. This is the last bloody warning your getting.[42]

With the creation of a Rabbit Destruction Council under the 1947 Rabbit Nuisance Amendment Act, the Department was relieved of day-to-day inspection and enforcement duties. It now simply serviced the Council, which proved better able to act against the rabbit population because of its independence and farmer representation. Moreover, the Government took a more generous attitude to funding the Council than it had to departmental control.

It was now acknowledged that the incentive to 'farm' rabbits had to be removed. This was done by progressively introducing a tax on skins and meat from 1947. The Rabbit Amendment Act of 1956 finally made it completely illegal to trade in rabbit products. At the same time the Rabbit Destruction Council introduced a new poison, sodium mono-fluoroacetate or '1080', that proved so effective that eradication really seemed possible at last.[43] Rabbit boards now proliferated; by 1960, 210 boards covered 15.1 million hectares. In 1964 the last remaining areas were brought under the control of rabbit boards.

In the early 1950s departmental scientists at Wallaceville had begun experiments with the rabbit disease myxomatosis, which had been first identified in Uruguay in 1896 and deliberately introduced into Australia after the Second World War. Results had initially been spectacular in Australia, with virtually complete destruction of populations, but this was not sustained, in part because the virus weakened but also because rabbits became immune. Although myxomatosis was endemic, rabbit numbers

increased to such an extent that conventional control techniques had to be reintroduced within 15 years of the introduction of the disease. A similar pattern occurred in Europe.

Between 1951 and 1953 departmental scientists introduced the disease into rabbit populations throughout New Zealand, but it failed to take hold because there was no flea or mosquito that could spread the disease effectively. The question of introducing a carrier was controversial, and '1080' poison was so effective that the use of myxomatosis was abandoned.

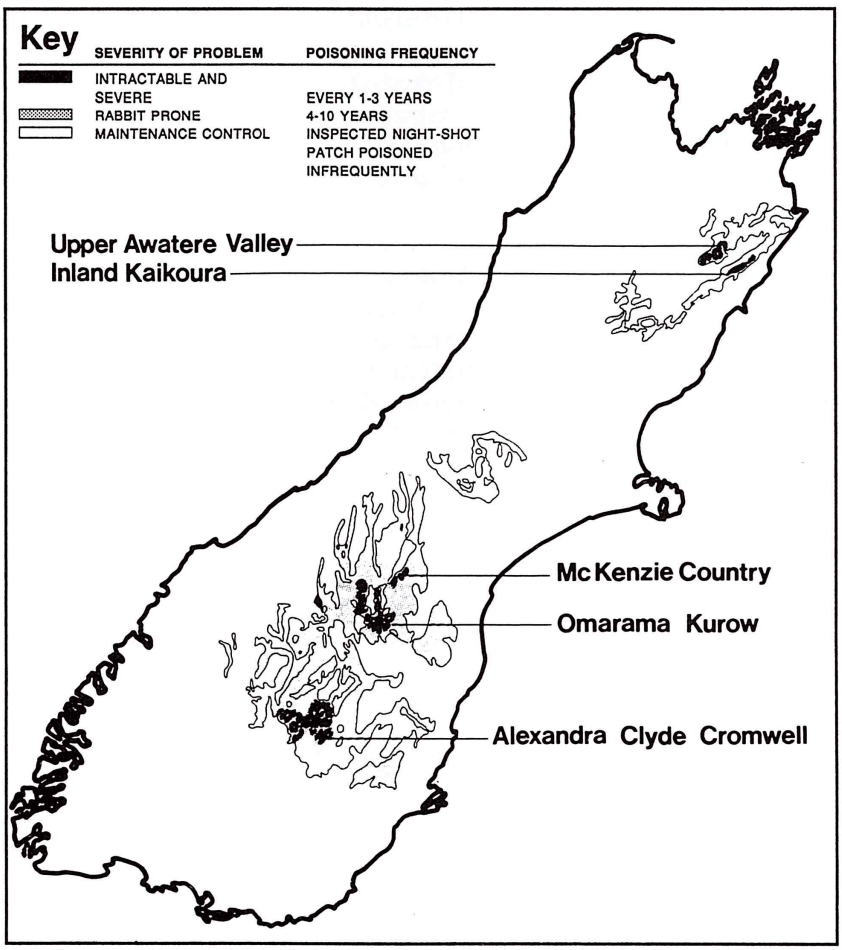
The 'killer policy', as it was known, was formally in existence from 1959 to 1971. It achieved a major reduction in the rabbit population, but not complete eradication, and by the late 1960s its cost-effectiveness was being questioned. Rabbit destruction was becoming more expensive, and in some areas other pests were equal or greater problems. The Government had made rabbit boards responsible for all pest destruction in 1964, and in 1967 changed the Rabbit Destruction Council into a wider Agricultural Pest Destruction Council (APDC) to recognise this enlarged responsibility. In 1971 the Council acknowledged that lower rabbit numbers could allow a policy of containment rather than eradication. Further research was done on how to control numbers.

By the early 1980s many scientists felt that research had revealed major weaknesses in existing control measures. It appeared that rabbit populations on productive, intensively farmed land were controlled naturally, and that such farming did not provide a good habitat for rabbits.

> Most premeditated attempts to destroy a population have been unsuccessful ... populations are more vulnerable to a manipulation of their habitat than they are to a direct manipulation of their numbers .... The reduction in density occasioned by the control measures leaves the quality of the resources intact while increasing the quantity available to each surviving animal .... Most control operations are in reality, informal harvesting programs that take a sustained yield.[44]

Despite this view, the APDC and most boards continued to use traditional control measures.

In the 1980s, concern over the degradation of the high country became allied with the environmental lobby and a belief that high-



Parliamentary Commission for the Environment Investigation into Myxomatosis

Forty years of intensive rabbit control contained the pest in most areas. However, in some localities, particularly in the South Island, rabbits have become resistant to conventional control techniques.

country land management had been inadequate. In 1983 the Pest Destruction Review Committee recommended that government funding for pest destruction be stopped, arguing that farmers should deal with the problem by their own land management. The Government thus began to withdraw its funding. In response, the

APDC called for the introduction of myxomatosis to contain rabbit numbers. An environmental impact report in 1985 recommended against its introduction, and advocated a policy of habitat alteration in preference to traditional control measures.[45]

The 1988 report of the Rabbit and Land Management Taskforce recommended the creation of a rabbit and land management programme for high-country areas in the central South Island. MAF has set up a five-year programme to assess the issue in the widest possible way.[46] The 100 farmers involved in the programme must prepare detailed property management plans, with the ultimate aim of sustainable land-use management.

The Agricultural Pest Destruction Council has now been abolished and its functions devolved to regional councils, in the belief that these organisations will be more cost-effective and sensitive to local needs.

Chapter 3

The Department, Science and Technology

The Grasslands Revolution

The production of meat, wool, and dairy products is dependent on grass growth. This simple imperative led to the fundamental changes in pasture development that have been called the 'Grasslands Revolution'. The first stage was the replacement of native grasses by exotics which began in the South Island with the diversified mixed farming of the 1870s. The second stage involved changes made to grasslands as the result of scientific evaluation of soils, plant suitability and animal husbandry in the first half of this century. The third fundamental change was the regrassing of hill country that was made possible by the development of aerial topdressing from the 1940s.[1]

Adapting to Local Conditions

In the 1870s most New Zealand runholders did little more than graze their sheep on the existing tussock country. By the early twentieth century improved pasture covered more than a third of the total land occupied. This development was most pronounced on South Island tussock grasslands and cleared North Island bush country. As the world price for grain rose in the 1860s and 1870s, lowland pastoral runs were transformed into mixed farming operations. Tussock land was ploughed to produce wheat for several seasons and then regrassed in exotic

Alexander Turnbull Library, F.A. Hargreaves collection

Prior to the development of aerial topdressing, pasture was difficult to establish in hill country, which had to be burnt frequently to remove secondary growth.

pastures, which often produced a fourfold increase in fodder production.[2] In the North Island, where grass seed was spread on the land after vegetation had been burned off, the fertility built up in the soil often led to high yields from exotic pastures for some time. High production could be sustained in the long

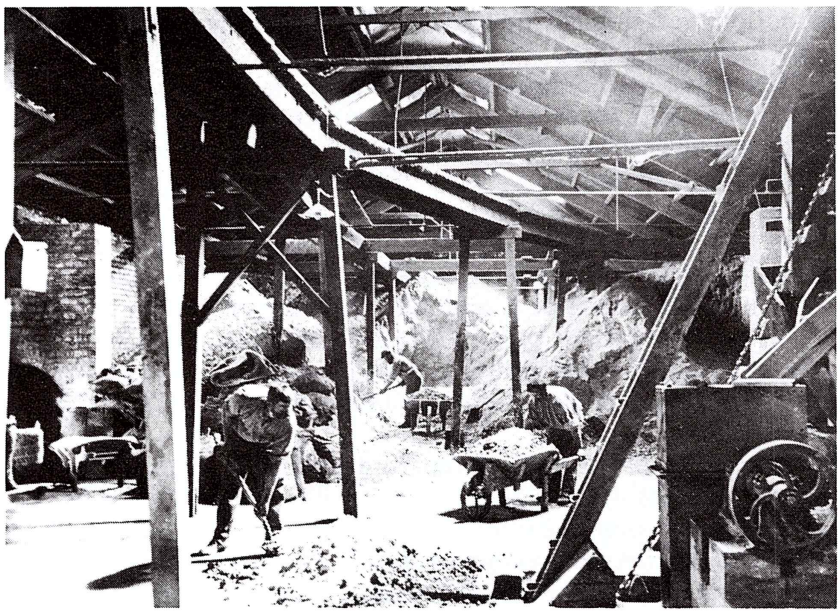
term, however, only if fertility was maintained by applications of phosphate fertilisers.

This first period of improvements to grasslands was based on British scientific ideas which viewed pasture as part of a mixed-farming cycle which also included winter fodder crops. High-producing ryegrass and clover were planted, and this made quality stock feed until the sward deteriorated as fertility declined. After a season, most of the ryegrass had died and grasses of less grazing value predominated. After several years in pasture, the land would be ploughed and cropped before renewed pasturing. Permanent pastures were less common and often of poor quality. These techniques were generally adopted on New Zealand farms, but disquiet remained as to their applicability to local conditions.

This disquiet was reflected in domestic farming journals and in a clamour for advice relating specifically to New Zealand. The journals could disseminate the experience of local farmers, but they were not able to sponsor research. It was pressure for local research and experimentation that led to the creation of the Department of Agriculture.

However, little research was done at first, in part because of the limited number of qualified staff appointed to the Department, but also because of the burden of diagnostic work (identification of diseases, pests and parasites). Indeed, grasslands research was at first impracticable because of a lack of reliable techniques and statistical methods to ensure the validity of results.

Much of the initial experimental work was designed to demonstrate to farmers that it was cost-effective to use chemical fertilisers. Superphosphate had been applied in England since the mid-1840s,[3] but was little used in New Zealand prior to 1910. Edmund Clifton of the Fields Division and B.C. Aston, the departmental chemist, laid out a series of plots at Ruakura in the early years of the century to demonstrate the efficacy of phosphate fertilisers. They used both superphosphate and basic slag (a phosphate residue from steel-making). The slag, despite being lower in phosphate content, often proved more effective. At the time this was explained in terms of the reaction of the slag with acidic soils, but later its effectiveness was attributed more to its trace elements.



Ruakura

A view inside a fertiliser works early this century. This type of small-scale operation was quickly superseded by large mechanised factories.

Alfred Cockayne joined the Department as a biologist in 1904. His father, Leonard Cockayne, had taught him to look at plants within the context of the wider environment, and it was this perspective that Alfred applied to grasslands. He viewed grass in New Zealand as a complex crop grown for the purpose of producing meat, dairy products and wool. Grass growth could be stimulated in several ways. Topdressing with superphosphate could stimulate the growth of clover, which provided nitrogen for other grasses. As the stocking rate increased there was an initial increase in grass production because the animals returned more nitrogen to the soil in the form of urine and dung. Cockayne argued that grasslands research should have the highest priority since increased growth would increase the yield of animal products.

Cockayne also asserted that animal husbandry should be adapted to New Zealand's longer growing season compared with

temperate Europe. Grass could be made into silage and hay to tide cattle over the winter months. By using certified seed and fertilisers, a high-producing grass crop could be maintained, with less need for specialised fodder crops such as turnips.[4]

Prior to the First World War, Alfred Cockayne's studies on the management of high-country tussock lands gained considerable attention. He was critical of the annual burning of tussock which led to erosion and declining fertility. He also established a biological laboratory in Wellington to help farmers identify plants and seeds, and published a series of articles on New Zealand grasslands in the *Journal of Agriculture* between 1910 and 1920.

Cockayne thus recognised the limited impact he could achieve through research alone. It was one thing to identify appropriate fertilisers, grasses and land management techniques, but it was quite another to get farmers to follow expert advice. After the First World War he became increasingly involved in the development of a farm advisory service. His efforts culminated in the reformation of the Fields Division, which was responsible for the education of farmers in pasture development and management. While Cockayne focused his energies on extension work, a highly-qualified team of researchers was developed under E. Bruce Levy.

Cockayne and Levy lobbied hard for the creation of a plant research station devoted to the study of grasslands.[5] The arguments for such a station became part of the wider political debate surrounding the setting up of Massey Agricultural College and the Department of Scientific and Industrial Research. In 1928 a plant research station was set up adjacent to the Massey campus, under the joint control of the DSIR and the Department of Agriculture. Cockayne was made its director, and lived at Massey while still Director of the Fields Division.

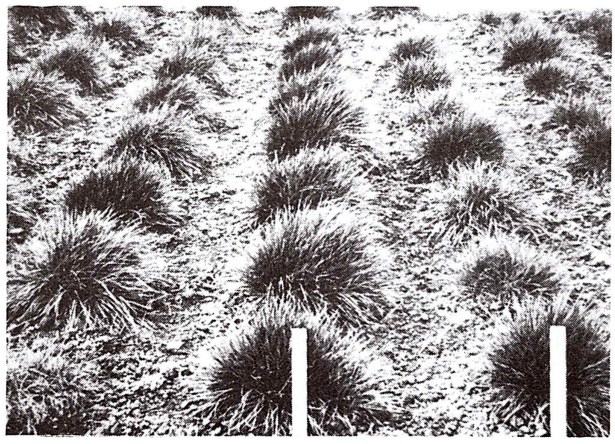
The Plant Research Station was modelled on the Dairy Research Institute, the precursor of a range of industry-related institutes that developed over the following decades and were increasingly funded by industry. This ensured substantial independence from both Government and university.

Levy's team had immediate success at Palmerston North. Within two years they made two breakthroughs that were to influence the direction of pasture management for the rest of this century. In 1929 they identified and bred a truly perennial strain

of ryegrass. This was generally recognised as the most nutritious grass for animal feed, but it had a tendency to drain the soil of nutrients and die out after one season. Levy's team had focused on areas such as Hawke's Bay where ryegrass lasted much longer. They also isolated two strains of white clover with enhanced nitrogen-fixing capabilities.

The combined impact of these two discoveries was considerable. Highly nutritious perennial ryegrass pastures could be sustained by the nitrogen fixed in the soil by superior strains of clover. These discoveries boosted Cockayne's general theory that high-producing permanent pastures could be sustained in New Zealand, and that there was little need for extensive planting of fodder crops and short-rotation pastures. Levy and the Fields Division instructors were quick to recommend and demonstrate the properties of the new grasses.

The research and extension functions of the Plant Research Station were related. It was the job of both scientists and field instructors to convince farmers of the advantages of the new grasses. This was not always an easy task. Most farmers were not inclined to fund development or take risks in a time of depression. Instructors had to overcome a wider cynicism. Many seed merchants had previously marketed unsatisfactory 'perennial' ryegrass. In order to overcome scepticism, Levy and the instruc-



E.B. Levy, *Grasslands of New Zealand*, 3rd edn

Once perennial ryegrass had been selected and cultivated, Levy's team developed even more productive strains. Here pedigree perennial ryegrass (middle row) is compared with the original Hawke's Bay ryegrass.

tors emphasised that they were independent of commercial concerns and interested only in boosting farm production. Extension work and recognition by farmers of the increased returns that the new grasses could bring led to a gradual acceptance of the new strains.

The introduction of new grasses also highlighted the impor-

E.B. Levy, *Grasslands of New Zealand*, 3rd edn

Pasture responds to nitrogen returned to the soil from animal wastes. Early studies by Cockayne, Levy and others forged a greater recognition of the part animals played in grassland development, and the importance of high-density stocking.

tance of using certified seed. What passed for high-quality seed was often poor seed heavily infested with weeds. Cockayne's seed examination service reached only a small proportion of farmers. What was needed was a system of seed certification at source.

The impetus for seed certification came from Dr F.W. Hilgendorf of Lincoln Agricultural College. Hilgendorf, who had successfully developed several superior strains of wheat, began an unofficial testing programme to ensure that seed sold to growers was of the highest quality. In 1921 this scheme was handed over to the Department of Agriculture for development. In 1927, departmental agronomist J.W. Hadfield successfully launched the certification of wheat and potato seed, and this was extended

E.B. Levy, *Grasslands of New Zealand*, 3rd edn

Plot trials of white clover strains. The mid-front and mid-back plots are pedigree and mother-seed strains. The low-recovery plots (front left and front right) are poor commercial strains that dominated the market prior to about 1930.

to some pasture seeds in 1929. The programme never became compulsory, but farmers soon learned to buy only certified seed if they wanted to maximise returns.

Pasture Development on the Gumlands

The relationship between the extension and research roles of the Department was not always a comfortable one. Farm advisers wanted solutions to specific problems so they could advise farmers on how to develop and manage their land. Researchers wanted resources for pure research, but also needed access to farmers to test their theories. P.W. Smallfield was a farm adviser in the 1920s on the 'gumlands' of North Auckland – poorly drained land, once covered by kauri forests. He began his work before the isolation of improved ryegrass and white clover, but later used the new strains.

> In the early 1920s, theory and practice were unanimous that the fertility of the gumland soil must be raised through preliminary fertility-building plants before sowing the land to permanent pasture. *Lotus hispidus* was commonly used for this purpose and the seed, usually accompanied by a pound or so of paspalum, sown with a hundredweight of basic slag or North African phosphate on a harrowed surface, made ready some months before sowing ....
>
> The plants make a fairly thick mat on the surface and this was useful in slowing up manuka re-establishment from seed.
>
> The soils require a ton or more of ground limestone per acre, along with a moderate dressing of phosphates, before grasses and clovers will flourish .... Following two or more years under *Lotus hispidus*, the land was ploughed.... The permanent pasture mixture sown usually consisted of perennial ryegrass, paspalum, white clover and *Lotus ulignosus* (at that time called *Lotus major*) and very often a pound or so of browntop was added. The perennial ryegrass usually disappeared after the first year and there was often a break of a year or more before paspalum became established .... Settlers soon

> ran through their capital or loan moneys and their financial resources were often exhausted before enough pasture was established to feed a small dairy herd properly. It used to be said that it took three owners to make a gumland farm – two had to walk off and the third, profiting from the work and financial loss of his predecessors, was able to establish a workable small farm.
>
> The introduction of certified perennial ryegrass and white clover in the early 1930s revolutionised gumland development. Profiting from methods worked out on the pumicelands, it was found possible to omit the fertility-raising temporary pasture phase after the first cultivation; then, through application of fertilisers and lime, make the young pasture build up a veneer of fertility on the original almost sterile soil.[6]

The Department and the DSIR

The Palmerston North Plant Research Station had a wide brief and employed scientists from a variety of backgrounds. Many of the researchers were more highly qualified than Cockayne and this became a source of tension. Dr G.H. Cunningham, a mycologist and entomologist who had worked in the Horticulture Division, made it clear from the beginning that he felt that all research should be administered by researchers and that this would only be possible if the station came under the control of the DSIR.[7] Cockayne disagreed strongly with this view and restated his belief that all research should be closely associated with extension work. Cockayne's view initially prevailed, but his role as director of the station became compromised with his appointment as Assistant Director-General of Agriculture on the retirement of F.S. Pope in 1929. Cockayne moved back to Wellington, remaining director of both the Fields Division and the Plant Research Station. His position further exacerbated the tensions between scientists and administrators at a time when the whole Department was undergoing expenditure cuts. Cunningham resigned dramatically in the spring of 1935, with effect from 30 November, a few days after a general election.

> After 18 years' service Dr G.H. Cunningham, Mycologist at the Palmerston North Plant Research Station, today severs his connection with the Department of Agriculture.
>
> When interviewed by the *Times*, Dr Cunningham said that he greatly regretted the necessity for leaving the Department, as he had been for so long intimately connected with its scientific work. During his service he has been fortunate in securing the friendship of officers of various divisions of the Department, State Forest Service, and Department of Scientific and Industrial Research, and was extremely sorry to sever his connection with such a fine body of able men.... [C]onditions for development and pursuance of research work were so unsatisfactory that he was unable further to continue.... [H]e had been unable to induce the Director-General of the Department of Agriculture to remedy the many disadvantages under which he and fellow officers of the station had to labour....
>
> Although the Director-General ... had failed to remedy the disabilities of which Dr Cunningham had complained, he has definitely refused to allow the Department of Scientific and Industrial Research to take over and administer the station. The latter was obviously the proper authority to direct research work, as it was a scientifically qualified body with the necessary knowledge to understand work of the nature conducted by the station, knowledge not possessed, in the opinion of Dr Cunningham, by the lay administration of the Department of Agriculture.[8]

Cunningham's gamble paid off. He was summoned to Wellington by the incoming Labour administration and asked to outline the reasons for his resignation. Cockayne would have agreed in general with Cunningham's objectives, but he had little sympathy with his methods. Much work on reorganising the station had already been done, and the planned expansion awaited only increased funding.[9] Cunningham, a controversial figure at the station, was not speaking for all scientists. A group of scientists headed by Levy wrote a letter in support of Cockayne in which they made it clear that they did not wish to work in any organisation controlled by Cunningham. But the Labour Government wanted to be seen to act decisively, and it transferred responsibility for the Plant Research Station from the Department of Agriculture to the DSIR in April 1936. Of more significance for the scientists concerned was Labour's policy of increasing expenditure on science. Salaries were raised and new facilities built.

Four new divisions of the DSIR were created. They were widely separated geographically and given a considerable degree of autonomy. The Grasslands Division under Levy remained on the Massey campus, the Plant Disease Division and Cunningham moved to Auckland, the Agronomy Division was transferred to the Lincoln campus, and the Entomology Division was attached to the Cawthron Institute in Nelson.

Cockayne saw the removal of plant research from the Department of Agriculture as unjustified and unnecessary. He repeatedly called for its return, and was only somewhat appeased when the Department was given responsibility for animal research in 1939. Despite this underlying tension, the Fields Division maintained a very close relationship with the DSIR. The DSIR undertook much original research that was relevant to farmers, while the Fields Division officers ran field trials to test research, and then advised local farmers what specific new techniques should be used.

Aerial Topdressing

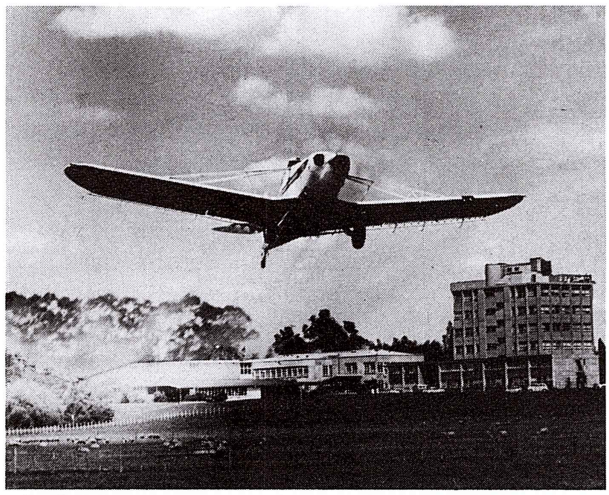
Up to the Second World War there had been great changes to New Zealand's lowland pastures but little alteration to hill-country pastures. High production from ryegrass pastures was possible only if soil fertility could be maintained. In general this was achieved by the application of fertilisers, particularly superphosphate. It was often not possible to topdress hill country economically, and less productive grasses that could thrive in less fertile conditions continued to be planted. Hill-country farming was also characterised by an unrelenting battle against reversion to scrub. The Departments of Agriculture and Lands were both involved in the administration of the 1925 Deteriorated Lands Act, an attempt to grapple with the problem.

A solution appeared in the last years of the war. In 1943 A.M. Prichard of the Public Works Department seeded lupins from an aeroplane on Ninety Mile Beach. This work proved that it was technically possible to use aircraft for topdressing. In 1947 the Department of Agriculture monitored aerial topdressing trials carried out in association with the RNZAF, DSIR, Federated Farmers, and several fertiliser companies.[10] Its cost-effectiveness was quickly recognised, and by 1949 there were five firms using

Ruakura

Right *An aerial topdressing plane being filled. Purpose-designed loaders sped up the job.*

Below *A purpose-built topdressing aircraft being demonstrated at Ruakura.*



Ruakura

Tiger Moths. The growing industry employed former air force pilots and aircraft.

The Department encouraged aerial topdressing, and farm advisers promoted a change to high-fertility clover and grass pastures on hill country. Although most farmers reacted cautiously to this innovation, it allowed production to increase well beyond what would otherwise have been possible, and problems of hill-country reversion were at last tackled successfully. The Department responded with further research, and opened the

Whatawhata Hill Country Research Station in 1949. Whatawhata was typical of the hard, untopdressed soils of the North Island. Stocking rates were quickly increased with the aid of aerial topdressing. The facility carried out the Department's first substantial research into sheep farming, an area which had previously been left to Massey Agricultural College and farmers.

Sheepmeat production grew by over 50 per cent between 1945 and 1960, and beef production more than trebled. Most of this extra capacity came from hill-country farms.

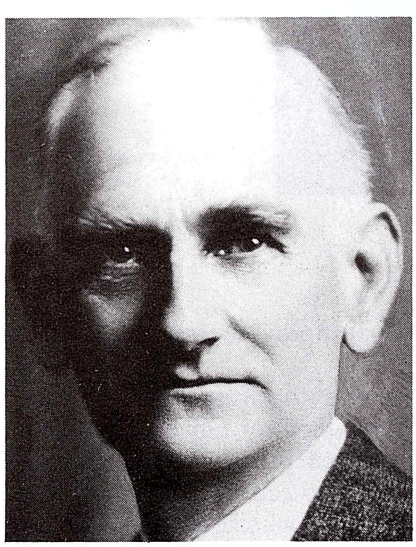
Biographies

A.H. Cockayne

Alfred Hyde Cockayne was born in Christchurch in 1880. His father was the noted botanist, Leonard Cockayne, whose international fame was based on his study of New Zealand native plants. Alfred studied botany at Canterbury University College and in 1904 was appointed assistant biologist with the Department of Agriculture.

His early research work was on the South Island tussock lands. He constantly reminded the public of the central place of grass in pastoral farming. In 1923 he became Director of the Fields Division, and in 1928 he was also made Director of the Palmerston North Plant Research Station. Cockayne always saw research as an adjunct of practical advice to producers. In 1929 he became Assistant Director-General of Agriculture, and in the early 1930s he was involved in the establishment of the New Zealand Grasslands Association.

In 1936 the DSIR took



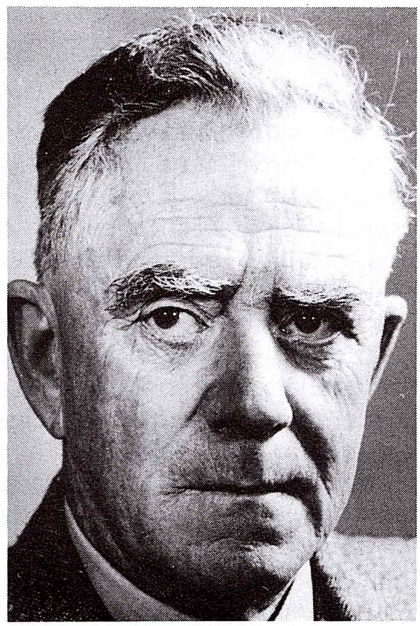
National Archives, MAF collection

A.H. Cockayne.

over the Palmerston North Plant Research Station, despite Cockayne's opposition. Cockayne was promoted to Director-General in 1936 on the retirement of C.J. Reakes, and in 1939 he established the Animal Research Division. Much of his time as Director-General was dominated by his role as Primary Industries Controller during the Second World War, when the Department took responsibility for the distribution of goods in short supply. Cockayne retired in 1943, when he became chairman of the School of Agriculture (Massey and Lincoln) for a two-year period. He also served on the Council of the University of New Zealand. He was made a Companion of the Imperial Service Order (ISO) in 1936, and a CBE in 1956. He died in 1966.[11]

E.B. Levy

Enoch Bruce Levy was born in Auckland in 1892. He joined the Department of Agriculture as a clerical cadet in 1911, but soon moved into work relating to grasslands, under the supervision of A.H. Cockayne. By the time he gained his BSc from Victoria University College in 1926, he was developing an international reputation in the field of plant breeding. In 1928 he was made team leader of grasslands research at the Palmerston North Plant Research Station. During the next season his team isolated a truly perennial ryegrass and two white clovers of high nitrogen-fixing ability. These discoveries, which greatly enhanced the productive capacity of



National Archives MAF collection

E.B. Levy.

pasture, were of international significance.

In 1936 Levy reluctantly severed his association with the Department of Agriculture and moved to the DSIR when the Plant Research Station was placed under its jurisdiction. As Director of the Grasslands Division from 1937 he maintained strong links with his former department, particularly the Fields Division. He was always conscious of the importance of applying scientific discoveries, and remained in close contact with farmers.

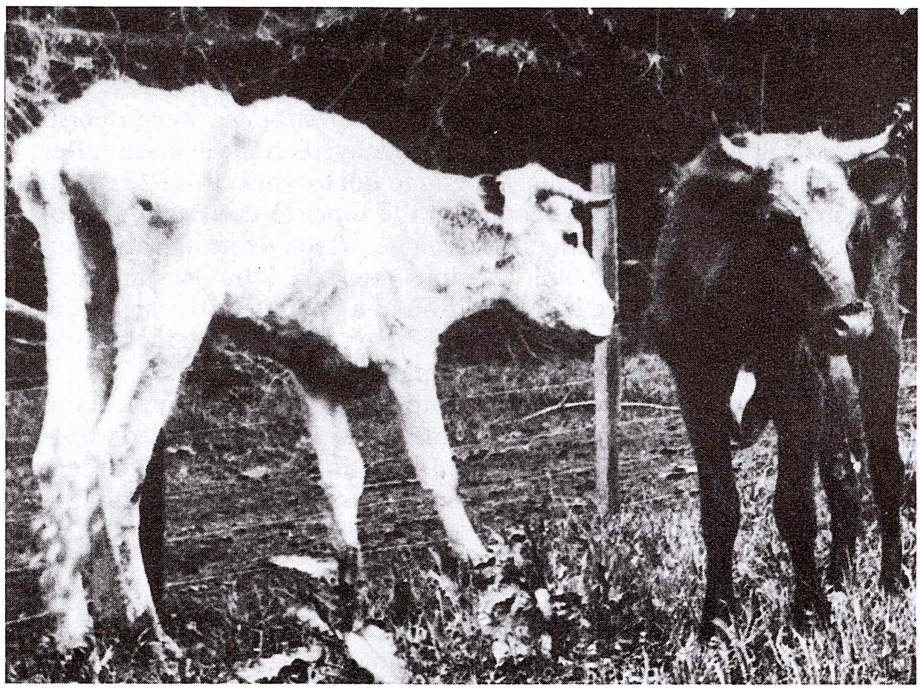
Levy retired in 1951. He was awarded the OBE in 1950 and was knighted in 1953. He was a life member of the New Zealand Grasslands Association and of the Royal Agricultural Association. Levy chaired the International Grasslands Congress held in New Zealand in 1956, and in 1964 set up the Grasslands Memorial Trust.

Levy's *Grasslands of New Zealand* is an international classic on pastoral farming. In retirement he concentrated his efforts on developing grasses for bowling greens and golf courses. He died in 1985 aged 93.[12]

The Campaign Against 'Bush Sickness'

'Bush sickness' was a wasting disease affecting sheep especially but also cattle, and was prevalent on the pumice country of the central North Island. These soils had largely been created by the Taupo eruptions of around 120 AD which had spread pumice over a vast area.[13] There was considerable interest in farming this tussock- and scrub-covered land that needed minimal development before stocking. Grass growth was vigorous and fodder crops grew well, but stock failed to thrive.

The problem led to the abandonment of many properties and dramatically slowed the spread of farming in the region, particularly in the worst-affected areas such as Tokoroa and Mamaku. Yet the productive potential of these areas was enormous if the problem could be overcome. Departmental veterinarians brought in to investigate 'bush sickness' in the late 1890s set about isolating its cause. It did not take long to determine that it was not infectious, and Andrew Park noted its clear association with volcanic soils. He also stated that the resulting anaemia became fatal unless the animals were moved well away. Farmers knew from experience that bush-sick stock would improve if trans-



Wallaceville

'Bush sickness' was the term given in New Zealand to the malaise suffered by animals such as the cattle pictured above, which was caused by a cobalt deficiency. Initial research suggested it was the result of anaemia, and the Department's chemist, B.C. Aston, spent two decades investigating stock intake of iron.

ported outside the region. This led to investigations by Gilruth, the Chief Veterinarian, and B.C. Aston, the departmental chemist, but no concerted research was undertaken.

So large an area of country was affected that the issue became a political one, and farmer groups lobbied for greater action. Thus in 1912 the Department bought a property at Mamaku on which to conduct research. The work proved to be complex and frustrating. Aston remained convinced that the cause was a lack of iron in the soil. Various mixtures, including iron sulphate, syrup of iron phosphates, and ferrous ammonium sulphate were given to stock. In most cases there was an immediate but short-lived

improvement in condition. Aston searched for an alternative source of iron, and eventually chose limonite, a naturally occurring ore that could be given to stock in the form of a salt lick. This appeared to be the answer because early supplies were rich in cobalt. Stock remained healthy if they stayed on the lick. But after a time the limonite strangely began to fail to work. In 1926 Aston delivered a well-received paper on the topic to the British Association for the Advancement of Science, which led to a grant from the Empire Marketing Board. Aston considered that the failure of later trials of limonite had been due to a change in the source of the material. This was closer to the heart of the problem, but the crucial trace element of cobalt remained unidentified.

In the meantime settlers attempted to farm the pumiceland despite 'bush sickness', and in some areas they maintained viable farms with the assistance of the Department's advisers. Others simply could not make a living. P.W. Smallfield spent time in the Bay of Plenty in the early 1920s.

> Livestock farming on the central southern areas [of the Bay of Plenty] was hindered by bushsickness and some scrub and fernland settlements were disintegrating. I remember visiting a number of deserted farms, which had been taken up in the 1900-1910 period, and I know of few more depressing sights.
>
> On the kitchen table in one of the deserted homes there was a copy of the Department of Agriculture's *Journal* lying open at an article on bushsickness, and I am still puzzled why it was left there as it was. Was it a warning to prospective settlers or a gesture to unkind fate, which had turned the promise of a thriving farm into a grave of buried hopes? Anyway, the journal was still lying there some 10 years later when I visited the farm again.[14]

The Department Develops the Pumicelands

Both the Department and the new United Government in 1928 were keen to demonstrate that the land could be farmed profitably, even though the cause of 'bush sickness' had not been pinpointed.

The 1929 Land Laws Amendment Act created the Lands Development Board, on which representatives of both the Lands Department and the Department of Agriculture served. The Board was empowered to develop Crown lands for sale, and its immediate focus was the pumicelands of the plateau. Smallfield was given the task of developing 1,000 acres of bush-sick land at Ngakuru for intensive agriculture.

The project began in 1930, when the Plant Research Station was developing perennial ryegrass and improved clovers.

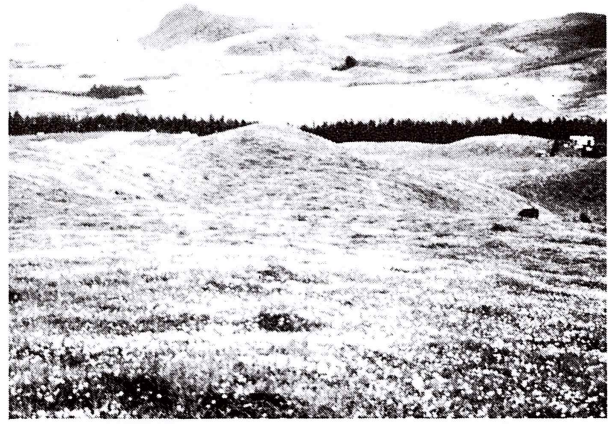
> I remember receiving a telegram early in February of that year advising me to make arrangements to grass 1,000 acres by March 1931 .... I would need to be lucky with the weather for scrubcutting and burning; ... Unemployment was then just beginning to be felt and I managed to collect enough scrubcutters ... and, as the weather was reasonably dry up to the end of May, the clearing and burning were by then completed ....
>
> I planned to plough all the land that could be ploughed and rolled, to surface cultivate land too steep to roll and to surface sow after burning land too steep for implements.
>
> The choice of a grass mixture posed a different problem. ... Pastures in which the dominant constituents were perennial ryegrass and white clover were required – and required at the initial sowing, for the cost of putting land through a fertility-building temporary pasture would greatly inflate development costs.
>
> I could find no evidence that there were any perennial ryegrass-dominant pastures anywhere on the Taupo shower. The problem hinged on whether white clover growth could be stimulated sufficiently, and early enough, to cover the bare ground between the young grass plants; and instead of building up fertility through temporary pastures of red clover, make the permanent pasture itself build up quickly a veneer of fertility. In practice this was accomplished by sowing 3 hundredweight of superphosphate with the seed, applying a further 3 hundredweight within four months of sowing (this application gave the necessary boost to white clover to cover all the bare

> ground) and another 3 hundredweight twelve months after sowing; thereafter dressing the land with 2 to 3 hundredweight annually. Thus a relatively cheap and efficient method of grassing was secured. The practices initiated at Ngakuru are now used fairly generally for grassing many classes of scrubland.
>
> Limonite licks were given to the milking cows when dairying began and the herds remained reasonably healthy. In an early trial with breeding ewes limonite proved successful for an initial flock of 500 ewes and good fat lambs were produced. But the following season, when the flock was increased to 3,000, the limonite used proved unsatisfactory and the ewes and lambs had to be moved off in November.[15]

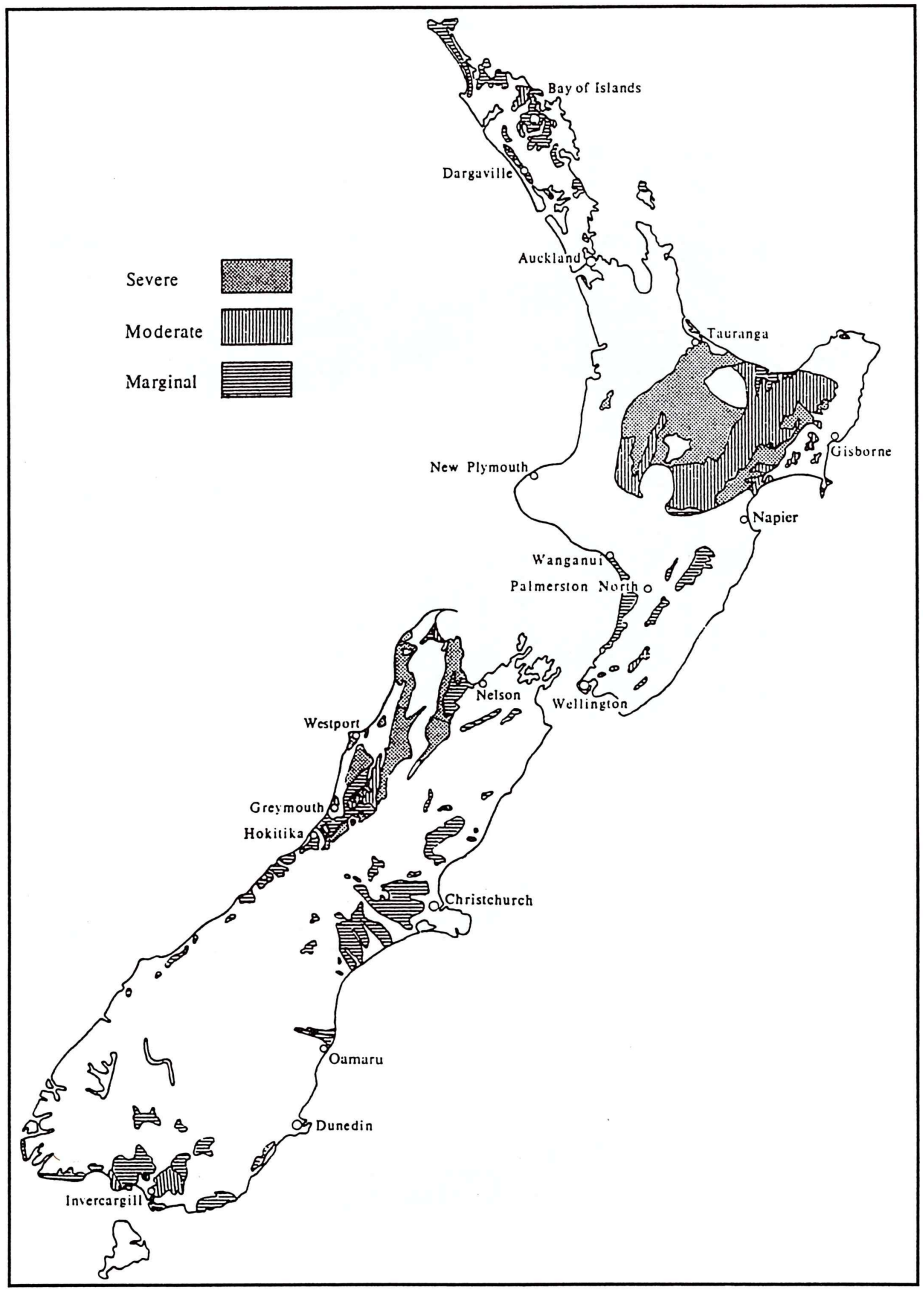
Aston's reports had been studied throughout the Empire, and his work was followed up by two Western Australians, John Filmer and E.J. Underwood. They were investigating 'Denmark disease', which was identical in appearance to 'bush sickness', and worked on the assumption that a difference in the forms of limonite used by Aston might explain his results. They first eliminated iron as a cause by feeding animals limonite from which the iron had been removed. The animals thrived. It seemed that Aston's success had been due to a trace element in the limonite. Nickel proved partially effective, but it was then found that the material was contaminated by small amounts of cobalt. This was then used on its own, and the dramatic results described by Aston were achieved immediately. The cause of 'bush sickness' had been found 40 years after the initial research. Underwood and Filmer published their findings in 1935. Over the next 10 years cobalt-based salt licks, cobaltised superphosphate and cobalt water additives were trialled. The major development of the pumice lands came after the Second World War. It was undertaken by the Department of Lands, with the Department of Agriculture playing an advisory role.

P.W. Smallfield, *The Grasslands Revolution*

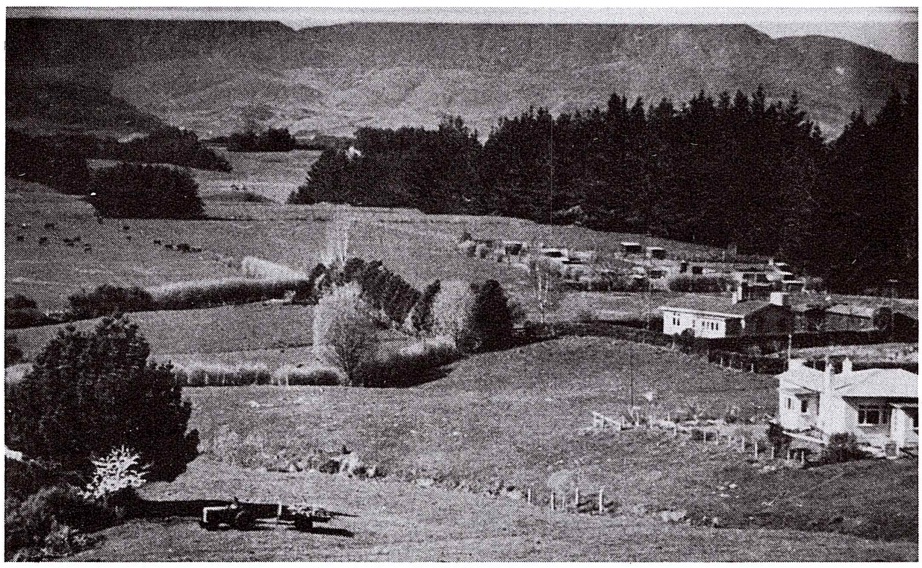
Above and right *The isolation of truly perennial ryegrass and the discovery of cobalt deficiency paved the way for development of the pumicelands. Between the early 1930s and the 1960s many thousands of acres were developed. This land at Ngakuru is being cleared in the early 1930s.*



P.W. Smallfield, *The Grasslands Revolution*



McLintock (ed), *An Encyclopaedia of New Zealand*



P.W. Smallfield, *The Grasslands Revolution*

Above *The same Ngakuru land in the late 1960s.*

Left *Cobalt deficiency is common in New Zealand. The national soil survey carried out by the DSIR between the 1930s and the 1960s identified these areas and the degree to which they were cobalt-deficient.*

Biography

B.C. Aston

Bernard Cracroft Aston was born in 1871 in Beckenham, Kent, England. He moved to New Zealand with his family as a boy and attended Christchurch Boys High School, Dunedin Technical College and Otago University, where he trained under Professor Black. He obtained work with a cement company on Black's recommendation. Aston then worked in Dunedin as a consultant chemist for the Government, and in 1899 joined the Department of Agriculture.

Aston set up a soil analysis laboratory which examined samples sent in by officials and farmers. His early work included an investigation of poisonous native plants with Professor T.H. Easterfield of Victoria University College. He also tested export butter and conducted milling and baking trials on wheat.

National Archives, MAF collection

B.C. Aston.

Although soil analysis was hampered by a lack of accepted methodology and techniques, Aston participated (with Edmund Clifton) in a series of superphosphate trials at Ruakura. He is best known for his pioneering work on 'bush sickness'.

Aston was a member of the New Zealand Institute and of the Royal Society for 55 years and held high office in both organisations. He was awarded the CBE in 1948 and died in 1951.[16]

The Department and Formal Agricultural Education

The establishment of the Fields Division increased the Department's contact with farmers and improved the dissemination of scientific information. However, a wider need for information demanded resolution of the role of the state in agricultural education. This debate went back to the 1880s and reached a climax in the 1920s with the controversy surrounding the founding of Massey Agricultural College. The Departments of Agriculture and Education, farmer groups and various tertiary institutions were all involved. What evolved was a compromise in which the Department of Agriculture played a central role, even if it did not become the major provider of agricultural education.[17]

Agricultural experts were scarce, and the Department had to go to considerable lengths to recruit them. It did this in a variety of ways. The ranks of farmers were drawn upon. Many of the early fruit advisers were orchardists of long standing, with no academic

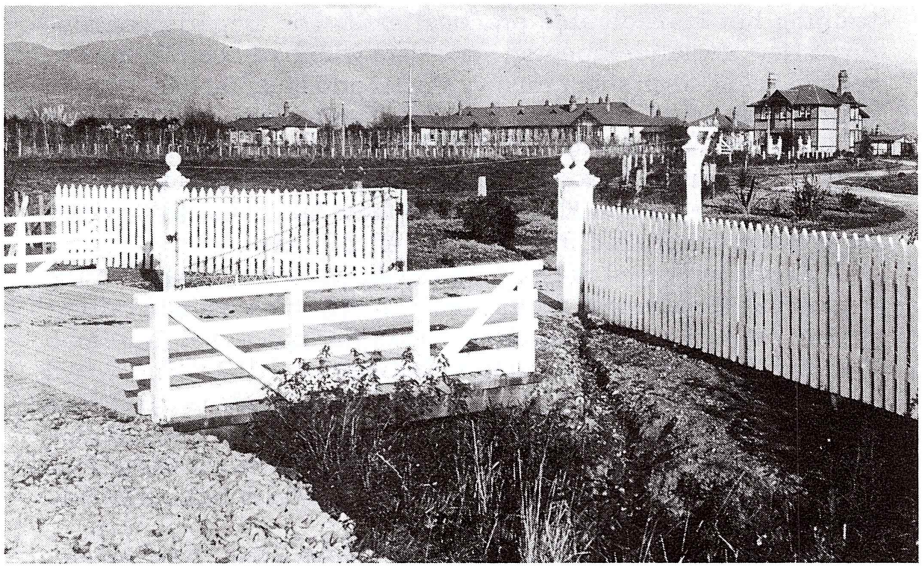
training but considerable practical skill. The Department also hired New Zealand-educated scientists who had been trained in related fields. Its first botanist, [illegible]logist and chemist had all been educated at New Zealand univer[illegible]sities. If suitable experts were not available locally, as was often the case, the Department would take the expensive option of looking overseas. Veterinarians were hired from the United Kingdom and later Australia, while dairy experts were recruited from a range of countries.

Without improved educational facilities in New Zealand, the expanding Department would have to rely increasingly on imported expertise. The supply of local graduates was minimal; Lincoln College had turned out only three by 1919.[18] The Board of Agriculture created by the Reform Government in 1914 was given the task of examining agricultural education and making recommendations, but war forestalled progress. Massey had given way as Minister to the Liberal W.D.S. Macdonald, who had little time for the Board.

The Department itself moved to fill the gap when John Brown, B.Agr.Sc. (who had replaced Clifton as Director of the Fields Division in 1916), established the Central Development Farm at Weraroa, Levin. Weraroa was to provide a base not only for demonstration and experimentation, but also for pure research and tertiary training affiliated to a university college. It was intended that Fields Division staff would be trained there. Senior officers such as Brown, A.H. Cockayne and A. McTaggart moved to Weraroa in 1917, and were joined by some of the Department's scientific staff. Macdonald supported the Department's initiative, which offended the Board greatly.

This ambitious concept was never fulfilled. John Brown was implicated in a scandal concerning private grazing on the farm, and he soon left the public service. Without Brown no one was willing to push the scheme. The Central Development Farm remained in existence in name only until it was reconstituted as a regular experimental farm in the early 1920s.

The questions of who would train agricultural scientists and where this would be done remained unresolved. Representatives of the Departments of Agriculture and Education met in 1920 to discuss the issue. It was agreed that the Department of Education would be responsible for all primary and secondary school agriculture, and that it would encourage the growth of agricul-



Alexander Turnbull Library, P.C. Williams collection

The Weraroa Farm of Instruction was set up as the Central Development Farm in 1917 to train scientists and advisers for the Department. The aim proved too ambitious and it became an experimental farm again in the early 1920s.

tural high schools in rural areas. The Department of Agriculture would be responsible for extension work and the training of youths who had left school, and support for school agricultural courses. The officials agreed that it would be possible to establish a properly equipped agricultural university college producing a significant number of graduates.

The direction of tertiary agricultural education continued to be discussed over the next few years. The debate tells us much about the role of the Department of Agriculture and the division of responsibility for agricultural education and research. In 1922 the Senate of the University of New Zealand, frustrated by the poor performance of Lincoln College, investigated tertiary agricultural education and recommended that the Government develop an agricultural college at Victoria University College in conjunction with the Department of Agriculture, together with a chair of agriculture at Auckland. It was proposed that the Weraroa experimental farm be used for practical work.

The Senate then brought A.E.V. Richardson from Melbourne University to look specifically at Lincoln. He was critical of the low

Alexander Turnbull Library

While the Department of Education was primarily responsible for agricultural education at secondary schools, the Department of Agriculture's officers often assisted with lectures or advice.

level of scientific content in the degree course, and recommended that either a four-year course be provided, utilising the resources of both Lincoln and Canterbury University College, or a completely new college be created, attached to Auckland or Victoria and using Ruakura or Weraroa for practical work.

Richardson's report was, in general, consistent with the Senate's recommendations, but restraints on government spending meant that nothing was achieved. In many ways this was convenient for Prime Minister Massey, who opposed the creation of a tertiary agricultural institution and championed 'agricultural colleges' teaching practical farming rather than science. Massey, by no means alone in this view, was happy to use divisions within the farming community over the issue to avoid making a decision.

Bequests for the creation of chairs of agriculture at Victoria and Auckland soon forced the Government to re-examine the issue. G.S. Peren was appointed Professor of Agricultural Science at Victoria in June 1924, and William Riddet became Professor of Agriculture at Auckland in September 1925. The situation was clearly absurd. There were now three competing tertiary agricultural institutions, none of which had the facilities to produce a sufficient number of graduates. The Prime Minister called for a report by the Board of Agriculture, and included agricultural education in the brief of the Reichel-Tate Commission to review university education in New Zealand.

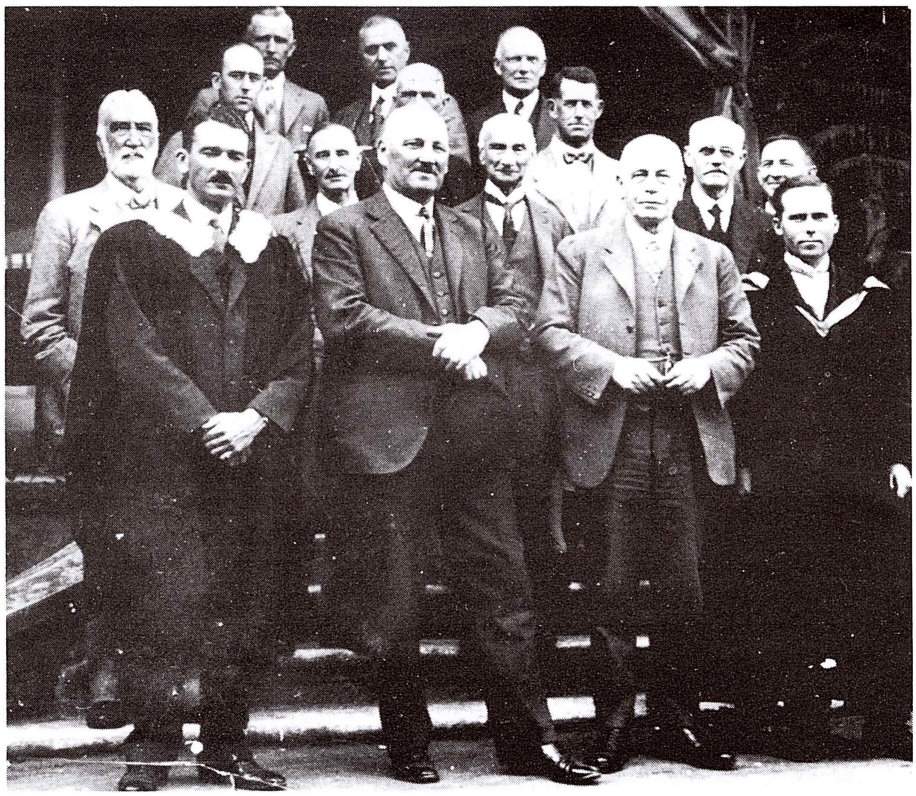
The Board favoured the gradual development of a single university college in the North Island. In the short term, there should be a college based at Auckland associated with Ruakura, one at Victoria linked with Wallaceville, and an upgrading of Lincoln. The report was a muddled document because a majority of members actually rejected the idea of a university in favour of more intensive development of farm schools, while the chairman, J.G. Wilson, was strongly committed to the creation of a tertiary institution.[19]

The Reichel-Tate Commission, which reported in 1925, opposed the Board's scheme which, in its opinion, would leave the country with three schools of 'anaemic mediocrity'. It was highly critical of Lincoln, and doubtful that the college could improve in the immediate future. The commissioners recommended that there be one well-equipped, independent agricultural university, a position also argued by Peren of Victoria. It was to the credit of

Riddet and Auckland that at this point they decided to co-operate with Victoria in creating one college rather than engage in ongoing parochial conflict.

The new Prime Minister, J.G. Coates, and his Minister of Agriculture, O.J. Hawken, were both keen to establish a viable college, and accordingly introduced the New Zealand Agricultural College Act in 1926. The new college would be an independent teaching institution capable of turning out the graduates the Department needed.

The newly formed college council, anxious to locate a site, was



Massey University Library

Massey Agricultural College was founded in 1927. Pictured at the ceremony were (Front row) Professor Peren, O.J. Hawken (Minister of Agriculture), Sir George Fowlds, Professor Riddet. In the second row at the far left is Sir James Wilson (Chairman of the Board of Agriculture).

determined to demonstrate its independence. Land in Palmerston North was chosen by Riddet and Peren despite the lobbying of C.J. Reakes, the Director-General of Agriculture, who backed Marton. The Batchelar property at Palmerston North was purchased in December 1926.

Massey University Library

The main building pictured here was built after Massey's opening.

South Island MPs and Lincoln's principal and board obtained a highly beneficial settlement after putting pressure on the Government. Lincoln was granted £10,000 to upgrade facilities and an annual grant of £3,700, as well as equal status with the Massey (previously New Zealand) Agricultural College. The change of name was in memory of the recently deceased Prime Minister – an ironic choice given Massey's consistent opposition to the creation of a tertiary agricultural institution.

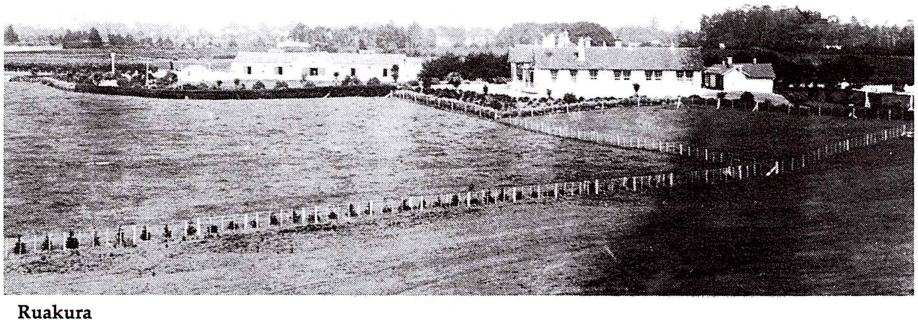
What was still not clear was the research role of the two colleges and the status of the Department of Agriculture's scientists. The Reichel-Tate report had envisaged an American-style agricultural college undertaking teaching, extension and research, and providing short, lower-level courses as well as full degrees.

The New Zealand colleges did not develop such an all-embracing role. The Department of Agriculture's rural extension function was not questioned. The Department was also determined to maintain its control over research. To do this would require a research station near a university, and Cockayne lobbied hard for a Palmerston North location. Peren wanted to maintain his independence and was wary of Cockayne's proposal. During negotiations the DSIR made a strong bid to take over the Depart-

ment of Agriculture's plant research function, citing the reports by Sir Frank Heath and the Reichel-Tate Commission favouring independent research guided by scientists. Cockayne, in defence of the Department's control of research, noted the close links with extension work. In 1928 a Plant Research Station under joint DSIR and Department of Agriculture control was established adjacent to Massey. Staff remained attached to the department they came from as well as to the joint board. Not everyone was happy with this compromise, and the arrangement was to be a source of conflict over the following decade.

Youth Training and the Young Farmers Clubs

The Department catered for the education of young farmers in part through its extension role, but it also established farm schools at Ruakura and Weraroa in 1912. These offered one-year courses similar to Lincoln's diploma course. After the war the schools were used to train returned soldiers. In the early 1920s Ruakura reverted to its original function, while Weraroa returned to its role as an experimental farm with an emphasis on horticulture. Ruakura had about 40 students during the late 1920s, comparing favourably with Lincoln. The scheme was wound down during the 1930s, and finally terminated in 1939. The Department had assumed control of a private training



Ruakura

The Ruakura Farm of Instruction.

school, Flock House, in 1937; more generally, Massey and Lincoln had begun to take over this role.

Youth education was also conducted through Young Farmers Clubs. After the First World War the Department, in association with the Department of Education, set up a number of boys' and girls' agricultural clubs. This scheme was most popular in the Taranaki and Wanganui regions. In the mid-1920s it was decided to focus attention on senior boys and girls, but the move was stymied by government expenditure cuts and the Department withdrew from the clubs in the early 1930s.

The demise of these clubs paved the way for a new system based on the American 4-H clubs.[20] L.J. Wild, the principal of Feilding Agricultural High School, had picked up the idea on a trip to the United States, and set up the first Young Farmers Club in 1927. Whereas the 4-H clubs were mixed, Young Farmers Clubs were for young men only. Dr W.S. Hill set up a similar club at Otahuhu High School in 1932. With the formation of several clubs in the Palmerston (Otago) area, R.B. Tennent, Superintendent of the Fields Division in Otago-Southland, began to provide departmental support. Tennent saw the clubs as an excellent way of shaping young farmers' thinking, and set them up throughout the region. Their focus was on instruction, observation and competition. The idea caught on, and the Fields Division helped form clubs throughout the country. A national federation was formed in 1936. The Fields Division provided secretarial and organisational support as well as staff time for instruction.

After the war complementary bodies were set up for young rural women. Country Girls' Clubs were given similar support, although they tended to focus on the development of social and domestic skills rather than farming. The Department did not control these organisations, but was instrumental in their establishment and continued to play an important role in fostering them until the 1960s.[21]

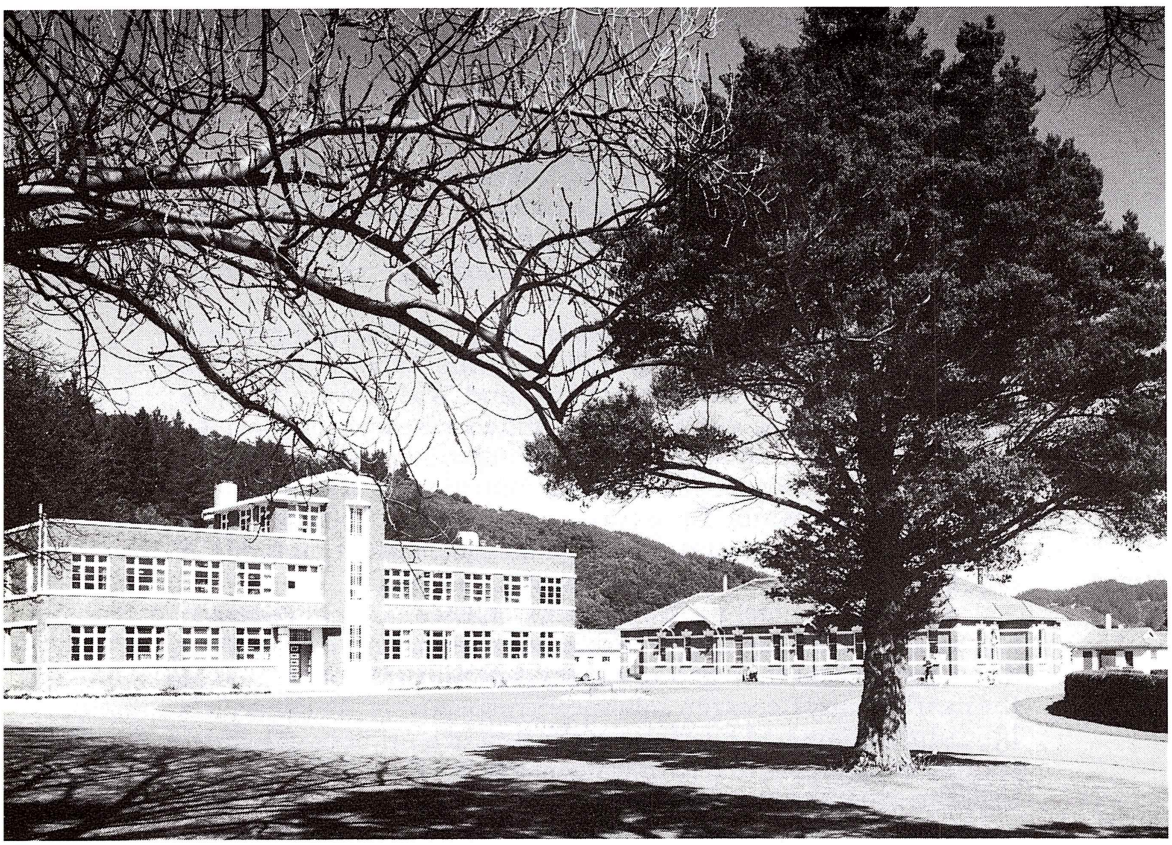
Animal Research

In a pastoral economy animal and plant research are closely interrelated. However, the study of animals and their relationship to pasture was slower to develop than that of grasslands. Animal research has several general aspects. As we have seen,

early research was into disease, to minimise stock losses. This had begun under Gilruth but was still only a minor function of the Livestock Division by the 1930s. A facial eczema outbreak in 1938 precipitated the formation of an Animal Research Division in 1939, and departmental research on animal disease expanded. The new focus was on increasing production from healthy stock through better husbandry. This was consistent with the Department's earlier grasslands and extension work, and it was to be an important factor in boosting production until the early 1970s.

Gilruth had investigated diseases such as TB, anthrax and 'blackleg', and had set up the Wallaceville Laboratory.[22] This impetus faded with his successors, and Wallaceville became largely a diagnostic centre. Only limited research on specific issues, such as 'bush sickness', was undertaken. From 1931 Dr Ira Cunningham investigated animal nutrition, and particularly the role of magnesium. Dr Marion Cunningham, who worked on pig nutrition, demonstrated that skim milk lacked vitamins A and D, and was therefore inadequate to rear pigs.

Despite government retrenchment policies, animal research expanded during the 1930s. Professors Peren and Riddet were developing research teams at Massey Agricultural College and at the nearby Dairy Research Laboratory respectively. Wallaceville's Ira Cunningham had been one of the first of a number of highly-trained researchers to return from overseas. When Labour came to power in 1935, it immediately demonstrated a greater commitment to providing resources for research. These were largely channelled into DSIR plant research, but a series of outbreaks of facial eczema, culminating in 1938, led the Minister of Agriculture, William Lee Martin, to set up an Animal Research Division within the Department under the control of Dr John Filmer, the Australian co-discoverer of the cause of 'bush sickness'. Such a step was consistent with Martin's desire to emphasise investigation and instructional work and reduce the inspectorial functions of the Department. The Government provided £10,000 for research work and an additional £7,000 for buildings at Ruakura. Filmer controlled two stations, the laboratory and farm at Wallaceville headed by Dr C.S.M. Hopkirk, and the former Ruakura farm school, now an animal research station under P.W. Smallfield. Wallaceville focused on animal disease, while Ruakura was to examine a wider range of matters with the goal of increasing productivity.



Wallaceville

Wallaceville in the 1950s. On the right is the original Gilruth Building, while the Hopkirk Building is on the left.

The varied functions of Ruakura and Wallaceville have been described in histories of each institution. Here we examine two crucial examples of their work.

Facial Eczema

'Facial eczema' was first noted in Gilruth's annual report in 1897, although the term had been in use for some time and

occasional outbreaks had probably occurred since the introduction of exotic grasses in the 1870s. The disease was thought to be unique to New Zealand, although this has proved not to be the case. Gilruth soon established that it was not contagious. It seemed to be seasonal, developing mainly in autumn when summer drought was followed by rain and rapid grass growth. There were major outbreaks in 1908, 1910 and 1935. The disease was usually most severe on the east coast of the North Island, particularly around Gisborne.

While many animals died, others eventually recovered. Symptoms included the scabs on the faces of sheep which gave the disease its name. Similar lesions occurred on cow udders. Affected animals sought shade, for reasons which were unclear. Slaughtered stock had liver damage similar to that resulting from poisoning.

Wallaceville

A sheep showing facial lesions.

Ruakura

A cow with lesions on the udder.

A major outbreak of facial eczema in 1938 led to considerable pressure being put on the Government and to the formation of the Animal Research Division. Oddly, good farmers – those who had high-quality pasture and followed the Department's recommendations – seemed to be the most affected. Farmers became angry that the Department could neither deal with the problem nor reduce the risk of an outbreak. Work on facial eczema began at Ruakura in 1939, but was severely disrupted by the war.

Very little was known about facial eczema. Gilruth's observations were a starting point, while South African studies of a similar problem had showed that the sensitivity to the sun that led to the eczema was caused by the toxin phylloerythrin, which was created during the breakdown of chlorophyll. This finding was confirmed for the New Zealand version of the disease, but the liver damage remained unaccounted for. Discussions between A.H. Cockayne and C.S.M. Hopkirk brought ryegrass under suspicion, and a Wallaceville expert, Jock Neill, was put to work

on the relationship between fungi and ryegrass. Neill's work appeared to rule out a fungal cause, but later it was realised that mistaken interpretations by others had led to this erroneous conclusion.

Five areas of work were undertaken:

1. Field surveys to define as accurately as possible the conditions under which facial eczema occurred.
2. Studies of the after-effects of facial eczema in ewes to assess the longer-term significance of the disease.
3. Studies to determine whether phylloerythrin was in fact responsible for sensitivity to the sun.
4. Experiments to discover the cause of liver damage.
5. The development of practical methods to control the disease.[23]

Research was complicated by wartime staff shortages and the unpredictablity of outbreaks of the disease. However, it was quickly found that pregnant ewes were the most susceptible, and that phylloerythrin was indeed causing sensitivity to the sun. What proved more difficult to identify was the agent causing the liver damage that led the animal to retain the phylloerythrin.

Research was also hampered by the fact that many new techniques had to be developed. Producing and preserving samples of 'toxic grass' to feed to animals under controlled conditions proved difficult. John Filmer described the difficulties:

> Pasture was mowed daily from the area [Whakaki, 1941] from January to April and fed green to penned lambs. Definite liver damage was produced in some of these. This greatly strengthened the hypothesis that the liver damage was due to a substance in the pasture, but before the chemists could start their task some means had to be found of preserving the pasture which did not destroy the liver-damaging factor.
>
> .... Freezing appeared to be less attractive, as the transport of frozen grass in large quantities to the chemistry laboratories at Wallaceville and Ruakura would have presented difficulties.

> In 1942 grass was preserved by boiling and sealing in tins and small quantities were preserved in alcohol. No liver damage occurred in lambs grazing on the experimental area in that year.
>
> To determine whether grass remained toxic after preservation, it had to be fed to lambs and experience showed that from 100 to 250 lb. of green grass was necessary for a test with a single lamb. This presented great difficulties with preservation in alcohol, which for obvious reasons would have to be evaporated off before feeding. This method was continued only on a small scale....
>
> In 1943 grass was preserved by boiling and by drying.... Eventually, with helpful advice from commercial canneries, grass was successfully preserved in 378 tins holding approximately 6lb. of green grass each.
>
> Grass was dried by drawing air from a coke furnace by an electric fan and forcing it through layers of pasture held in trays. In this year about 2 tons of grass was dried....
>
> The preserved grass was sent to Wallaceville, where it was fed to lambs and guinea pigs. The boiled grass produced only very mild liver damage in 1 of 2 lambs and in none of the 6 guinea pigs. Dried grass produced liver damage in varying degree in 10 out of 11 lambs and in 13 out of 39 guinea pigs. It was thus shown that the toxicity of grass could be preserved to at least some extent by drying. Another forward step had been made.[24]

Despite increasing knowledge about facial eczema, including means of prevention, scientists remained unable to identify the causal agent. It was clearly caused by a toxin associated with grass, so farmers were advised to put stock into a ploughed paddock or a turnip field and feed them fodder crops or hay until the danger had passed. Because of the unpredictability of the disease many farmers were still sceptical of Ruakura's advice. Their frustration led to the establishment of an investigating committee which included farmers and academics.

The first significant breakthroughs came in the late 1950s. A DSIR scientist, Ken Mitchell, who had been examining the role of

copper and iodine on pasture, noted a low incidence of facial eczema on pastures treated with copper. Mitchell attributed this to the fungicidal effect of the copper, and he planned a series of trials to prove his theory.

Before these trials could be undertaken, there were significant developments at Ruakura. In March 1958 a high incidence of a residual white powder was found on beakers used for the chemical analysis of toxic grass. This was thought to be a fungus. Cam Percival of Ruakura discovered fungi in the form of a black powder growing around grass plants and turf sent for testing. The spores were identified as *Sporidesmium bakeri* (the name was later changed to *Pithomyces chartarum*). Researchers produced a strain of the fungus, and found that it caused liver damage in guinea pigs. Tests on sheep confirmed the results. C.P. McMeekan announced the discovery of the fungus in August 1958, and Ruakura basked in the glow of public admiration.

It remained to provide practical help for farmers. Several years passed before the poison, sporidesmin, which caused the liver to break down was identified. Scientists could now predict outbreaks more accurately, and came to know a lot about the poison, but they were unable to control the fungus economically. The application of fungicides to pasture was unsuccessful until Gisborne pharmacist Merv Howe, acting on a hunch, suggested

This spore trap was designed to take samples from pasture.

Ruakura

that the Department try using a sheep drench with known fungicidal capabilities. Trials in 1966 using Thiabendazole reduced the spore count, and more extensive trials in February 1967 gave similar results.

These findings were not publicised because the scientists were unsure of their validity. However, March 1968 brought heavy rain after a hot summer, and a high risk of facial eczema. The Director of the Agricultural Research Division, Lindsay Wallace, decided to release Ruakura's findings. Farmers responded, and luckily the drench proved effective. Later work established that the drench worked because of its non-toxicity to other organisms, its efficacy at low concentrations, its low solubility, and its ability to penetrate the waxy surface at the base of ryegrass.

Research on the toxin and fungicides continued at Ruakura until 1975, and related work on the breeding of resistant stock was begun in the 1970s. The use of zinc in treating affected animals was also undertaken. The prevention of facial eczema had taken 30 years of research, and it had been another decade before scientists had fully understood the poison and its effect on stock. Discovery of the fungus initially provided scientists with a reliable method of predicting outbreaks, and eventually led to the adaptation of fungicides to treat pasture.

The Number Two Dairy

Ruakura's focus was determined by its first scientist Director, Campbell Percy McMeekan, who was appointed in 1943 to replace Smallfield. He turned Ruakura from a training farm into an animal research station and initiated a distinctive approach to research. McMeekan, a charismatic personality, established for the station an international reputation which it retained after his departure, amidst controversy, in 1962.[25]

McMeekan was given a wide brief to investigate problems related to animal husbandry, and, with his academic background, might well have retreated to the laboratory like most animal research scientists. He chose instead to link his research closely with practical farming. Researchers were allotted land and stock, and encouraged to work in a farm setting. While laboratories were available, they were used in conjunction with experi-

ments with animals in the field. Fodder crops, food supplements and the keeping of animals indoors were avoided wherever possible; research conditions were to be as close as possible to those on New Zealand farms.

McMeekan, like Cockayne before him, stressed the importance of communication with farmers. A persuasive speaker, he instigated the Ruakura Farmers' Conferences so farmers could see what the scientists were doing. As attendance at these occasions grew, McMeekan became New Zealand's best-known scientist.

As well as setting the guidelines for research, McMeekan was involved in a long-term dairy-management experiment, testing the relative benefits of set stocking and rotational grazing. Set stocking was the practice whereby animals were fed hay grown on the farm, but no other supplements. They were thus subject to seasonal variations in feed supply. Under rotational grazing, the emphasis was on a high and stable level of nutrition throughout the animals' lives. Reports from Europe, where stock was kept indoors in winter, tended to support a belief that rotational grazing was highly cost-effective. McMeekan's aim was to test whether this was also the case in New Zealand.

The study began shortly after McMeekan arrived at Ruakura, and by the third year he could show impressive weight gains in calves reared under rotational grazing. They were 80 lb heavier in the first year and 150 lb heavier by the end of the second year than those grazed under the set-stocking system. However, weight gain was not an end in itself. McMeekan was most interested in the extent to which management techniques affected butterfat production. He now tested whether rearing or feeding was most important.

This research showed that herds on a rotational regime could yield an increase of up to 50 lb of butterfat per year. But rotational grazing required more time and effort, a problem which McMeekan now examined. As the experimental herds aged, the advantage given by rotational grazing lessened. This surprised McMeekan. It seemed that in adulthood even poorly nourished calves caught up considerably in comparison to better-fed animals. Factors such as cattle size, stocking rates, milking-machine management and quality of stock proved to be more important in improving production than was rotational grazing.

As a result of this research, McMeekan's enthusiasm for and

promotion of rotational grazing waned, and he was increasingly willing to point out the system's limitations under New Zealand conditions. His findings caused an international stir, although later work tended to confirm his claims. Criticism from overseas scientists at the 1956 International Grasslands Congress led him to experiment with increased stocking rates to test whether rotational grazing was more productive under these conditions. Further research did not alter McMeekan's general conclusion, however, that rotational grazing was of limited cost-effectiveness.

Expansion of Research

Research expanded greatly from the 1940s. By the early 1960s it consumed more than a fifth of the departmental budget, and by the mid-1980s it employed some 1,250 staff.[26]

Wallaceville continued to focus on diagnostic work and research related to disease. Work in bacteriology, parasitology, biochemistry and pathology was undertaken. Some of the more prominent research included investigations into the application of cobalt and copper to deficient soils, and work on the eradication of TB and brucellosis, internal and external parasites, parasitic resistance to drugs, and the reduction of agricultural chemical residues.

Ruakura focused on animal production. Experiments on dairy cattle twins received international attention in the 1950s. Twins were used extensively at Ruakura because it was found that they reacted similarly to the same management regimes, and hence their performance could be compared when they were subjected to different regimes. Four dairy units were established to investigate animal nutrition and growth. 'Wattie' Whittlestone and Doug Phillips did extensive research on the development of milking machinery, and produced a 'Ruakura' milking machine. Ruakura pioneered artificial insemination after the war, and undertook embryo manipulation in the mid-1960s. Sheep and beef research became more important and dairying less so in the 1960s, although innovative work was carried out on producing export beef from dairy cattle. Studies on fertility and reproduction gained in importance, and in the 1960s Ruakura led research into the effective prevention of bloat. In the 1970s and 1980s horticultural research was carried out at that station.

The Department of Agriculture's soil science unit had been based at Ruakura from the mid-1930s until after the war, when the Rukuhia Soil Research Station was set up. Some of its better-known work was on the effective use of phosphate and lime fertiliser, and on the trace element molybdenum. In more recent times the research station's functions have broadened and it has investigated deer farming and the possibility of establishing possum farming.

Biographies

J.F. Filmer

John Francis Filmer was born at Tatura, Victoria, and lived in Beverley, Western Australia, for most of his childhood. He graduated Bachelor of Veterinary Science from Melbourne University in 1916, and then spent three years with the Royal Army Veterinary Corps in Greece. After the war he went into private practice, and in 1925 joined the Western Australian Department of Agriculture in Perth. From 1928 he was in charge of research into Western Australia's equivalent of 'bush sickness', and in 1935, with E.J. Underwood, discovered the cause of the disease. For this work he was awarded an honorary doctorate by Melbourne University in 1938. He came to New Zealand that year to become a research officer at the Wallaceville Veterinary Laboratory and was appointed Director of the Department of Agriculture's newly-formed Animal Research Division in 1939. He

National Archives, MAF collection

J.F. Filmer.

was responsible for work at Wallaceville and Ruakura from 1939 to 1960, which included facial eczema research and work on TB, hydatids and bloat.

Filmer was president of the New Zealand Veterinary Association in 1945-46 and 1953-54, of the New Zealand Society for Animal Production in 1944-45, and of the New Zealand Grasslands Association in 1955. He was chairman of the Veterinary Surgeons Board, and a member of the Veterinary Services Committee in 1943-44 and of the Veterinary Services Council from 1947 to 1960. He was also a member of the Technical Advisory Committee to the New Zealand Dairy Board, of the Council for Scientific and Industrial Research, and of the Committee on Veterinary Education, and a non-teaching member of the Faculty of Veterinary Science at Massey University from 1962 to 1968. Filmer was awarded the ISO in 1961, and became a fellow of the Royal Society of New Zealand in the same year. He was given an honorary doctorate by Massey University in 1968 and made a fellow of the Australasian College of Veterinary Science in 1971. He died in 1979.[27]

I.J. Cunningham

Ira James Cunningham was born at Mangatainoka on 16 August 1905. He graduated from Victoria University College with an MSc with first-class honours in chemistry in 1928, and in 1931 completed a PhD at the Rowsett Institute of the University of Aberdeen. His thesis topic was on the role of copper in animal nutrition. He was appointed in 1931 to the Wallaceville Veterinary Laboratory, where he was to work on animal nutrition for some 23 years. He did much to challenge the traditional use of expensive mineral and vitamin supplements, and devised effective ways to detect deficiencies.

In 1936 Cunningham retrained as a veterinarian at Sydney University, graduating with first-class honours and a university medal.

Superintendent of Wallaceville Animal Research Station from 1945, in 1957 he became Deputy Director-General of Agriculture. In 1962 Cunningham was appointed the first Dean of Veterinary Science at Massey University, where he oversaw the establishment of the school.

In 1959 he was awarded the CBE. He received an honorary doctorate from the University of New Zealand in the same year and from Melbourne University in 1967. He was president of the New Zealand Society for Animal Production in 1946, chairman of the National Hydatids Council from 1959 to 1962, a member of the Council of Scientific and Industrial Research from 1960 to 1964, and a member of the Wool Board. He was made a fellow of the Royal Society of New Zealand in 1963, and served on its council until his death in 1971.[28]

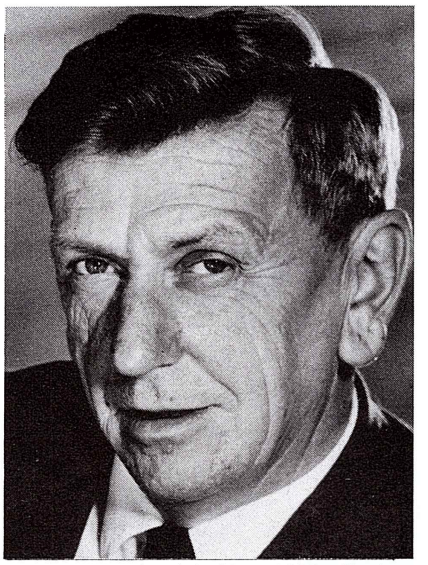
Proceedings of the Royal Society of New Zealand

I.J. Cunningham.

C.P. McMeekan

Campbell Percy McMeekan was born at Otaki in July 1908. He was briefly a pupil-teacher at Dannevirke before attending Victoria University College to study agriculture. In 1928 he transferred to the new Massey Agricultural College, from which he graduated B.Agr.Sc. in 1931. He was an assistant lecturer at Massey for four years, then studied under Dr John Hammond at Cambridge University's Animal Research Institute, where his work on pig production was very well received.

McMeekan returned to Massey in 1938 via Europe, the United States and South America, visiting animal research institutes on the way. Despite an offer to join the new Animal Research Division, he took up the first professorship in animal husbandry at Lincoln. At this time he believed firmly that research should be undertaken



National Archives, MAF collection

C.P. McMeekan.

at universities. McMeekan's years at Lincoln proved unhappy. He clashed so badly with the college's director, Professor E.R. Hudson, that constructive work became impossible.

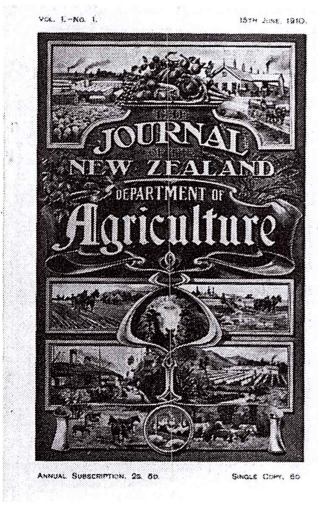
In 1943 McMeekan accepted the position of Director of the Ruakura Animal Research Station. He was given considerable freedom by his immediate superior, John Filmer, and the Department's Director-General, E.J. Fawcett. McMeekan favoured large-scale field research based on local farming practices. This innovative approach gained international recognition, and he was awarded a CBE in 1958. McMeekan's personality was suited to a public role, but as the station grew his deficiencies as an administrator became more evident. In 1961 he was passed over as Director-General of Agriculture, and he resigned after the failure of a very public appeal against the appointee.

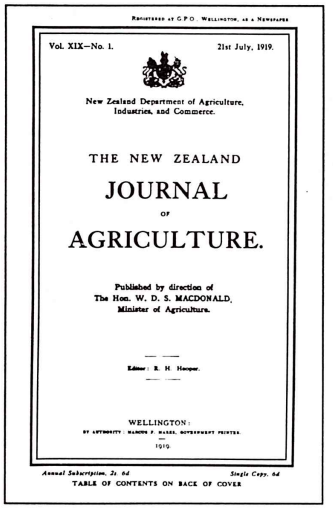
McMeekan worked for the World Bank from 1962 to 1966 and thereafter as a consultant. He was particularly involved with pastoral development in Uruguay. After returning to live in New Zealand, he drowned at Auckland's Westhaven boat harbour in July 1972.[29]

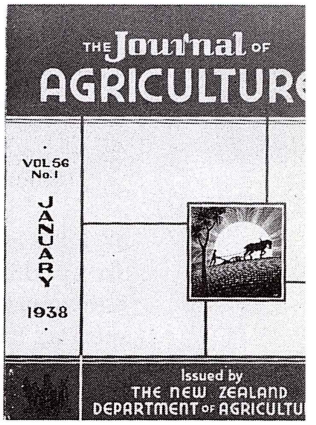
The *New Zealand Journal of Agriculture*

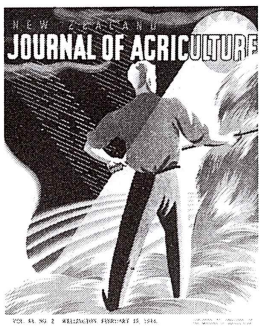
Pamphlets, lecture tours and extensive annual reports were the chief vehicles for the dissemination of information by the Department prior to 1910. In that year the Minister, Thomas Mackenzie, launched the *New Zealand Journal of Agriculture.* By this means, Mackenzie asserted, the farming community would get information from departmental experts as soon as it was available.

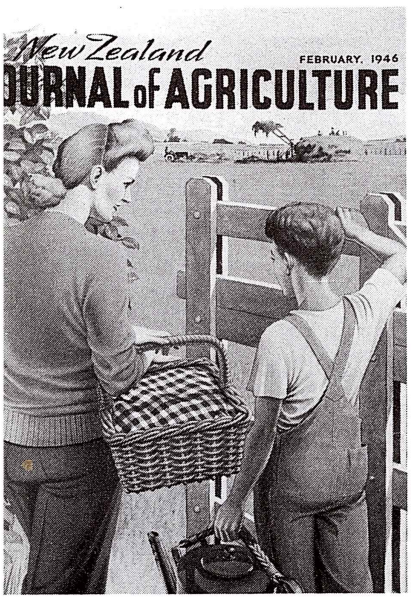
> I have established a monthly 'Journal' for the Department of Agriculture, the object being to bring the scientific, expert, and practical knowledge possessed by the experts engaged on the various services of the Department, within the reach of every farmer in the country.[30]







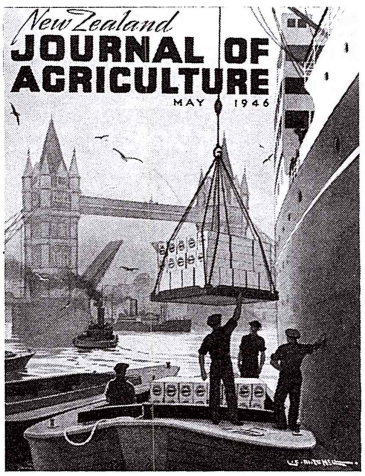




The first issue, adorned with a detailed montage on the cover, was a 78-page collection of essays on agricultural research and practice. While subsequent covers were very plain, the octavo-sized format was continued until 1938. The initial subscription was 2s 6d. Departmental officers were expected to contribute articles as part of their job. A.H. Cockayne began the series on 'Grasslands of New Zealand', while W.M. Singleton of the Dairy Division produced articles on dairy production with an emphasis on hygiene. In early 1912 the *Journal* nearly ceased publication because of a lack of subscribers. The Farmers' Union rallied to the cause and encouraged its members to subscribe. Sales rose from around 3,200 to nearly 10,000 by the end of the year. From that year also the *Journal* began to accept commercial advertisements. This placed it in competition with other rural publications, particularly the *New Zealand Farmer.*

During the First World War the *Journal* became a medium for government exhortations to farmers, who were urged to compensate for the lack of labour by a greater use of technology, and to grow more wheat to make the country self-sufficient.

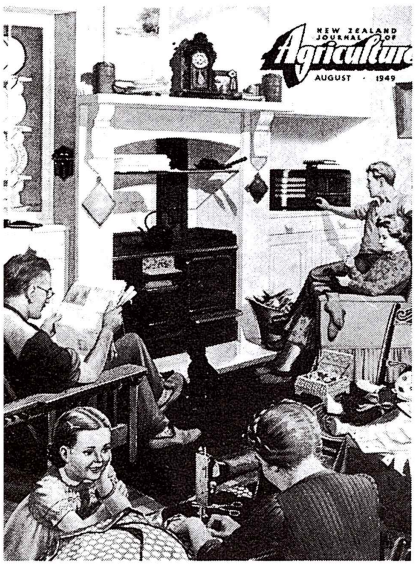
The subscription was increased to 4s in 1921. Circulation began to decline from this time and had dropped to a mere 3,000 by the depth of the Depression in 1934. The scientific nature of the publication and its plain format were seen as the main problems. A new editor, H.I. Forde, appointed in 1937, turned the *Journal* into a popular magazine with

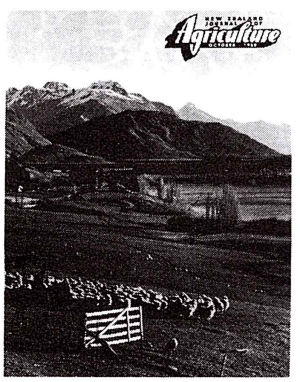


articles written especially for the lay person and a section for rural women. A bold new cover was adopted and sales began to climb once more.

During the Second World War the *Journal* was again used as a vehicle for the Government to get its message across to farmers. Publication was maintained despite labour and paper shortages, although during 1942 it shrank to as few as 64 pages, compared with the usual 150. Subscribers remained loyal. In 1944 the circulation was a healthy 23,000, and immediately after the war it grew dramatically. Sales reached 50,000 in April 1945, and peaked at an extraordinary 156,000 in June 1951. The *Journal* was by now characterised by informative articles written by departmental experts on all aspects of farming life, rural events and history. In the 1950s the *Journal* adopted colour photography, initially for the covers only but eventually throughout much of the magazine.

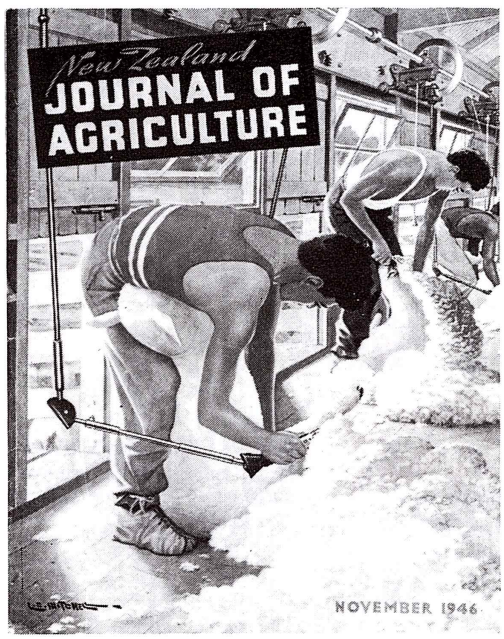
From the flowery design of 1910, which was so typical of the vogue for ornateness at the beginning of the century, the *Journal's* cover had evolved into a four-colour illustration showing usually a farming scene or a subject associated with farming. After the cover advertisements had given way to colour illustrations in 1944 the covers were reproductions of paintings by Wellington artists. The use of colour transparency photographs was trialled in 1949, and more than 100 such photographs were eventually reproduced on the *Journal's* cover. These drew much comment and many requests were received for copies.





From the 1951 peak, sales fell to around 50,000 by 1960. The magazine format had brought the publication into competition with other rural magazines, and there was a feeling that it was no longer the role of the government to publish a popular magazine. The increasing complexities of agricultural research were harder to communicate through such a medium; the Department was increasingly putting out bulletins and supplementary publications.

In 1965 the magazine was sold to the publisher Wilson and Horton. While the link with the Department was initially maintained, this diminished over time and the *Journal* ceased to be a useful vehicle for the Department. During its 55 years of publication by the Department, it had conveyed official thinking on farming

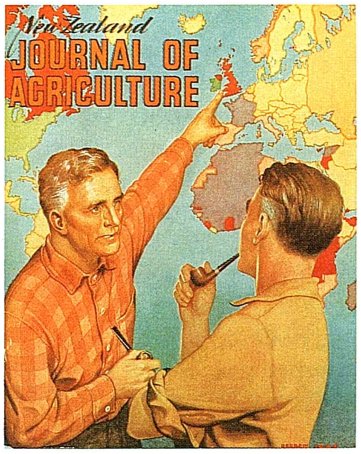


developments and disseminated valuable information which helped farmers increase production. The articles, few of them written by journalists, give the reader a real insight into agricultural research and the thinking of extension officers over the period. The consolidated index for the period 1911-65 lists thousands of articles which faithfully record farming developments in a unique fashion.

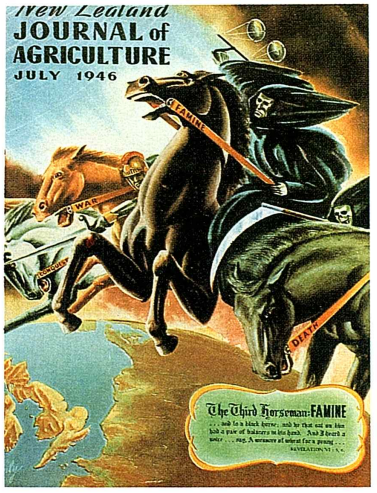
The *Journal* changed owners on several occasions after 1965 and ceased publication in 1988. Its last owner was Rural Press, which also published its chief rival, the *New Zealand Farmer.*

During the mid- to late 1940s the Journal commissioned paintings by such artists as L.C. Mitchell, A. Mitchell, M. Conly, J. Kenyon and N. Bolton. Most of the art was didactic and focused on the theme of maximising food exports to feed a hungry world.

Left *This December 1945 cover shows the New Zealand soldier laying down his arms and pullings up his sleeves to begin work to produce food for Europe.*

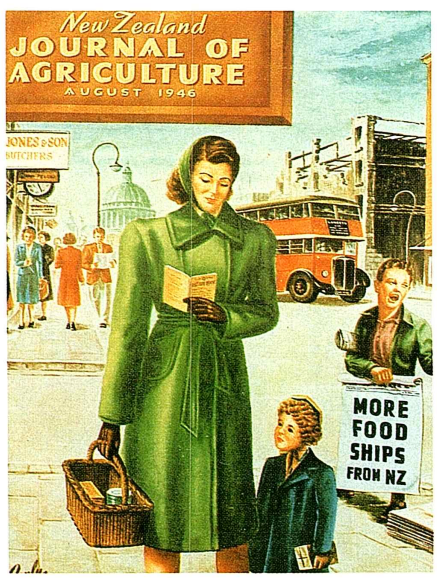


Two New Zealand farmers were depicted on the June 1946 cover showing Journal *readers where New Zealand's food exports were needed.*



The July 1946 cover conjures the apocalypse of Revelations. New Zealand's task was clear – to produce food to stave off disaster.

Right *The most well-known of L.C. Mitchell's paintings was probably that showing the signing of the Treaty of Waitangi, which appeared on the January 1949 cover. After the issue had been printed, the original painting was presented to the Waitangi National Trust and hung in the Treaty House.*



Above *With more than a hint of melodrama, this cover enticed the New Zealand farmer into producing food to sustain the ailing maiden, Europe.*

Left *M. Conly's August 1946 cover reflected the government's concern that production might fall off after the war. The cover focused on the food shortages in England and made it clear that it was New Zealand's duty to send as much food as possible to the United Kingdom.*

Chapter 4

The Second World War

Agriculture Between the Wars

During the Second World War the Department of Agriculture was called upon to perform a range of new tasks in areas that were previously considered the preserve of farmers.

In the years following the First World War agricultural production increased, mostly because of improvements in techniques.[1] Some new land, mainly marginal hill country or swamp, was brought into use. Many returned servicemen were put onto such land at a time when land speculation was rife. Some had farming backgrounds, some had been trained by the Department of Agriculture at Ruakura or Weraroa. Those who could not cope with the difficult conditions and falling prices were forced off their land.

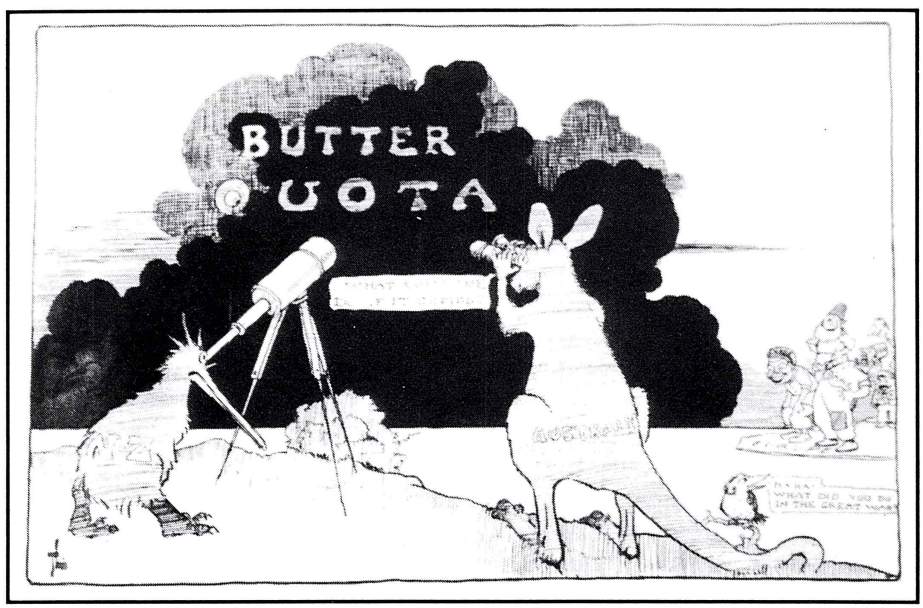
The most notable area of expansion was in dairying, the number of dairy cows doubling between the wars. This growth was reflected in the formation of the giant New Zealand Co-operative Dairy Company in 1919, and the increasing political influence of the dairy industry.

The intensification of farming was made possible by the widespread use of fertilisers on pasture. In 1920 the governments of Australia, New Zealand and the United Kingdom appointed the British Phosphate Commissioners to exploit the Pacific Island of Nauru, which had been given to Australia to administer under a League of Nations charter. This arrangement was to

assure New Zealand of a supply of cheap phosphate for the next 50 years.

The glut of primary produce that created low returns on the United Kingdom market in 1921-22 led to the formation of meat and dairy producer boards in New Zealand. The Dairy Producers Export Board experimented with compulsory marketing in the mid-1920s, but then returned to a role as co-ordinator of shipments and advocate for producers. The producer boards gradually eclipsed the Farmers' Union and the Board of Agriculture as advisers to government.

New Zealand agriculture had suffered badly from the collapse of export prices during the Depression. Wool prices fell by as much as 67.5 per cent and meat prices by 39 per cent between the late 1920s and 1932; cheese and butter dropped 45 per cent and 52 per cent respectively by 1934. The long-term increase in world production tended to exacerbate this decline.



New Zealand Herald, **Trevor Lloyd**

At the Ottawa Conference in 1932 Australia and New Zealand were threatened with quotas on butter and meat exports to Britain.

The desire of British farmers to protect their position by reducing imports was a major factor behind the calling of an Imperial Economic Conference at Ottawa in mid-1932. In exchange for no reductions in her primary produce exports to the United Kingdom prior to June 1934, New Zealand agreed to maintain a 20 per cent preferential tariff on goods imported from the United Kingdom. From July 1934 fairly generous short-term quotas for New Zealand primary products were introduced. In 1939 the British Government decided that the quota for lamb and mutton should be 3 per cent below the actual figure for 1938, which had been artificially low because of a drought. Only the fortuitous outbreak of war prevented a crisis of over-production.

In the 1930s, 80 per cent of New Zealand's exports were sold to the United Kingdom. New Zealand supplied a sixth of the United Kingdom's meat imports and more than half of its cheese imports. Competition from countries such as Denmark, Canada, Argentina and Australia was intense.

The Coalition Government assisted vulnerable farmers by reducing interest rates, providing mortgage and tenancy relief, and pursuing deflationary policies. Nevertheless, the cost of farm inputs fell less rapidly than prices for primary products. Even though the Coalition could rightly claim that it had done more to help farmers than any previous government, farmers were unimpressed and moved towards alternatives such as the Democratic Party, the New Zealand Legion and the Labour Party. Labour offered farmers an extension of the Coalition's assistance plus guaranteed prices. An account would be set up to even out returns to farmers in bad years and good.

Labour won power in 1935 with considerable farmer support, which was reinforced when export prices for all primary products rose substantially during its first two years in office.[2] This good fortune ended with a 5 per cent fall in prices in the 1937-38 season, and there was a further 3 per cent drop in 1938-39. The stabilisation scheme which had been adopted by the dairy industry plunged to a £1.9 million deficit. The fall in export receipts was not balanced by a reduction in imports, and Labour introduced exchange controls and import licensing to restore the balance of payments.

The Labour Government set about giving aid to the agricultural sector through several governmental agencies.[3] The Primary Products Marketing Act of 1936 introduced a guaranteed price

scheme for the dairy industry, with a view to its later extension to other primary products. This provided for a pool account to be created by a partial withholding of payments to farmers in good years. It was hoped that smoothing out the price would increase stability in the industry. The Government became the sole marketer of dairy products through the Primary Products Marketing Department.

Labour also refined previous government policies. Further relief was given under the Mortgagors and Lessees Rehabilitation Act 1936 to those having difficulty servicing loans and paying rent. With the reconstituting of the Mortgage Corporation as the State Advances Corporation in 1936, farmers were given improved access to another source of funds. The system of credit to Maori farmers supervised by the Department of Native Affairs was also expanded.

While the Department played an important role in monitoring the reactions of farmers, it was not the prime agent of Labour's reforms. The new Minister of Agriculture, William Lee Martin, professed a dislike for inspectors and controls, but expanded the advisory work of the Fields Division, particularly the extension area. The run-down of the Department experienced during the Depression was reversed and staff numbers grew from about 650 in 1933 to 1,015 in 1939.[4] The Dairy, Livestock, Horticulture, and Fields Divisions' functions remained generally the same. They were joined in 1939 by an Animal Research Division which struggled to create an identity for itself during the war but began to flourish by the end of the 1940s.

Wartime Production

In October 1933 a New Zealand section of the Committee of Imperial Defence was set up. This met infrequently and achieved little.[5] In 1936 it was renamed the Organisation for National Security – a more suitable title for a Labour Government. The Department of Agriculture was represented on the Supply in War Advisory Committee (SIWA) of the ONS. SIWA's task was to discover and assess potential problems in supplying New Zealand's industries in time of war. A preliminary survey of cool storage at meat and fruit exporting facilities was undertaken.

The Munich crisis of August 1938 led to the formation of 18 industry committees. The Department of Agriculture had

responsibility for meat, dairy and wool storage, and set up a Primary Industries Committee with a brief to investigate the consequences of the country being cut off from sea transport for three months. A comprehensive survey of refrigeration storage capacity showed that more than four times the existing volume would be required in such an event.

This was of major concern, and the Minister of Agriculture consulted with the major meat and fruit exporting organisations. After lengthy negotiations with various meatworks, threats, and delays caused by the Treasury's unwillingness to approve money for refrigeration equipment, storage capacity finally began to increase in late 1939.

The Primary Industries Committee also investigated the stockpiling of materials for the dairy, meat and wool industries, such as fertilisers, stockinette (used to wrap carcasses) and hessian. It also drafted regulations giving the Government power to direct, and if necessary take direct control of, primary industries. These covered the production, processing, manufacture, packing, storing, chilling, freezing and use of any primary product. After considerable debate it was decided to place primary industries under the Department of Agriculture rather than the Ministry of Supply. Little could have been achieved without the active co-operation of farmers, and the Department of Agriculture had long had a positive involvement with farming.

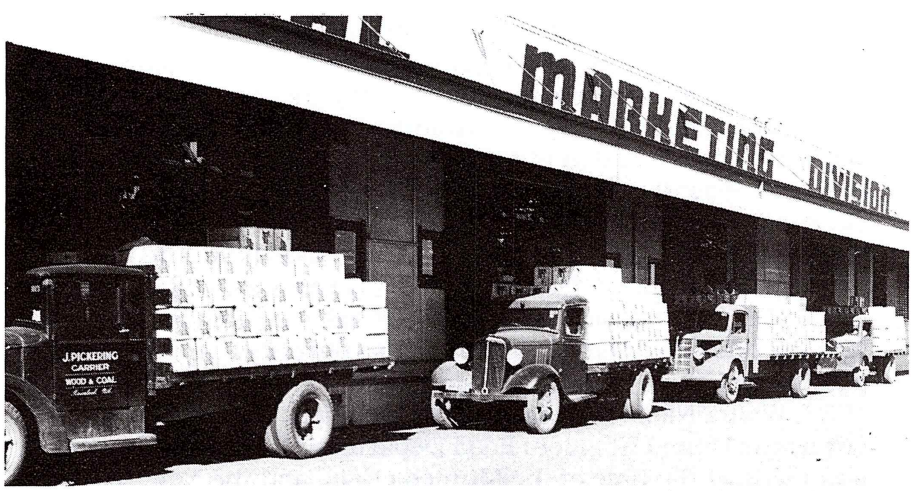
The Primary Industries Emergency Regulations were gazetted on 15 September 1939. The Director-General of Agriculture, Alfred Cockayne, was made Primary Industries Controller, with E.J. Fawcett as his deputy. The Primary Industries Committee was disbanded. For all the draconian powers available, the wartime administration of agriculture was generally benign and based on incentives rather than coercion. Farming was not even declared an essential industry, and was left to struggle with shortages in the same manner as many other industries.

Plans to safeguard the continued production and export of New Zealand's primary produce were carried out hastily after the Munich crisis. Agreement for Britain to purchase New Zealand's pastoral products in bulk had already been arranged. As early as 1937, Walter Nash, the Minister of Marketing, had been sounded out by the United Kingdom Food Department. A formal approach was made at the time of the Munich crisis, and the New Zealand Government agreed in principle to the bulk purchase of meat and

dairy products on 28 February 1939. Negotiations over wool continued until the outbreak of war. The prices for each product, negotiated just as the war began in September 1939, were to be an average of the prices paid in the previous seasons. Negotiations were aided by the fact that all dairy products were already sold through the Primary Products Marketing Department, which took over meat and wool marketing with little controversy in October 1939.

The bulk purchase agreements gave clear signals to New Zealand meat, wool and dairy farmers to increase production. With access to the United Kingdom market no longer an issue, the only danger to exports was enemy attack on allied shipping. This turned out to be less damaging than originally feared, thanks to the introduction of merchant convoys. The stationing of American troops in the Pacific provided a new outlet for New Zealand produce.

Returns to farmers did not always reflect prices negotiated by the Marketing Department. In general, increased dairy produce receipts were retained in the stabilisation account, although cheese prices were increased for the 1941-42 season to encourage production in recognition of its high nutritive value. Meat and wool increases were paid directly to farmers until stabilisation



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Right *Many of the surplus apples were given to schoolchildren. Not all pupils seemed to enjoy the experience.*

Opposite *Apples had been exported to Britain before the war, but during the war large surpluses built up in New Zealand. The Internal Marketing Division of the Primary Products Marketing Department disposed of the surplus crop.*

Alexander Turnbull Library, John Pascoe collection

accounts were created for these commodities in May 1942. For the rest of the war, the meat and dairy accounts grew as export returns rose. The contract price for wool was increased by 15 per cent in early May 1942, and this was passed on directly to growers.

In 1943 New Zealand was asked to go back to producing butter, and payouts for both cheese and butter were increased to compensate for the costs of conversion. These products were rationed in New Zealand from 28 October 1943. Further price increases for butter and cheese were negotiated with the United Kingdom in the last two years of the war.

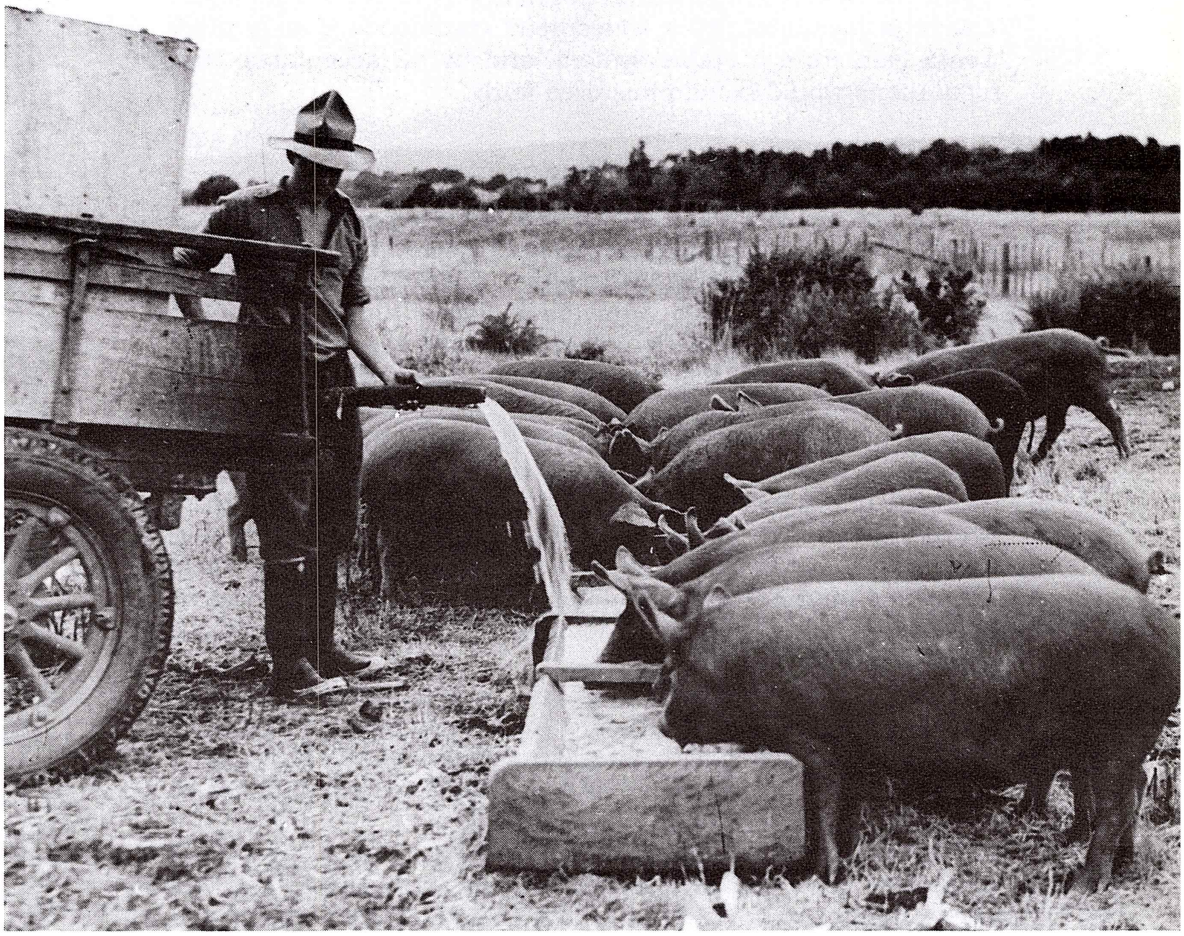
These wartime shifts in dairy production had considerable ramifications for the Department of Agriculture. Following the fall of The Netherlands and France in 1940, the British wanted New Zealand to increase its cheese production by 60 per cent at the expense of butter. The British Ministry of Food had determined that cheese was a more balanced food than butter, and it was more convenient to freight than meat.

W.M Singleton, Director of the Dairy Division, who had been with the Department since 1901, was responsible for shifting production to cheese. The Division pinpointed areas where a greater concentration on cheese was practicable and assessed the capacity for additional production. Singleton appealed directly to all dairy farmers by letter. This was followed up with visits by local Dairy or Fields Division officers. Resisting farmers were revisited by a more senior officer, and a letter from the Director followed. Only as a last resort did the Director actually issue an order to produce cheese. Very few of these were ever issued,[6] but the underlying powers of coercion obviously assisted the changeover.

The Division arranged for more than 6,000 dairy farmers to switch to cheese supply. With the co-operation of the industry, old cheese factories were brought back into production, existing factories were extended, and extra transport was provided to pick up the full-cream milk. Farmers who also raised pigs from skim-milk had to decrease pig-meat production in order to meet their new commitments. Others had to adapt milking sheds and storage facilities to hold full-cream milk until it was collected.

In 1942 cheese production reached a peak of 157,700 tons, very close to the target of twice the pre-war levels. This was a remarkable achievement, given its attainment by largely voluntary means and the lack of price incentives. But now New Zealand was asked to return to its previous emphasis on butter production, as more cheese had become available from North America. This was done by allowing farmers to change back as it suited them. Cheese production decreased substantially in the 1942-43 season, and the reversion process was almost complete by the end of that season.

The dairy industry struggled hard to sustain production levels during the war. Part of the responsibility for this can be laid at the Department's door. The changes in production had been expensive to make, and farmers were not fully compensated for this. There were also other factors working against dairying. Milk production was very labour-intensive, and although a higher degree of mechanisation was achieved by the end of the war, thanks in part to Lend-Lease, the industry felt the loss of labour more keenly than did other primary industries. The operations of the stabilisation account provided only limited incentive to increase production, since increased prices were often retained rather than paid out to farmers.



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This soldier-farmer is feeding skim milk to pigs. The shift in emphasis to cheese reduced the quantity of pork produced, because pig farming depended on skim milk, a by-product of butter manufacture.

War considerably changed the context of New Zealand agriculture. The bulk purchase agreements gave New Zealand guaranteed access and prices for its exports. Price stability meant that farmers could plan more successfully and cope with the additional constraints imposed by the war. Farmers accepted

regulation by Government to an extent never before contemplated. This was facilitated by a widespread confidence that farmers would gain from a stable system, and by an acceptance that regulations would be administered fairly.

The Councils of Primary Production

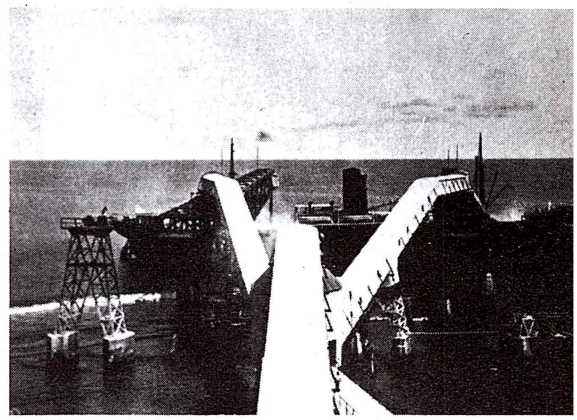
On the outbreak of war the Government sought advice from a variety of sources, including the Farmers' Union, the Sheepowners' Federation, the two Dairy Associations, the producer boards and farmers themselves. The Minister of Agriculture, William Lee Martin, realised production could be maintained only by a partnership between the Government and farmers. His solution was to create a National Council of Primary Production, which was set up in great haste. Its members were the Minister, the Director-General and Assistant Director-General of Agriculture, the Director of the Fields Division, and representatives of producer boards, the Farmers' Union, the Royal Agricultural Society and the New Zealand Workers' Union. It thus spanned the entire range of farming interests in an unprecedented way. District councils were formed to assist in the implementation of plans and advise on local conditions.[7]

The Council was intended to serve both as a forum for ideas and concerns, and to legitimate the Government's actions. If farming communities saw trusted farming leaders rallying together in support of government policy they would be more inclined to co-operate in maintaining production.

The Council's major concerns at its first meeting on 24 September 1939 were shortages of labour and fertiliser.[8] Farmers were already worried about losing their best workers to war service. Labour was to become dangerously scarce later in the war. Of more immediate concern was the country's lack of fertiliser. Less than six months' supply was stockpiled, and it was difficult to obtain more because of world-wide demand and limits on production at Nauru.

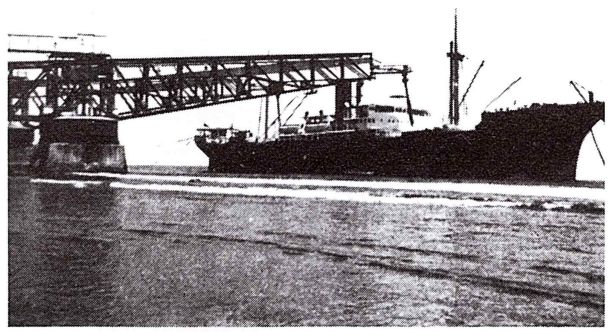
By August 1940 the cost of importing rock phosphate had risen by 50 per cent. Subsidising the price of superphosphate had cost the Government £151,000 in three months. Increasing consumption was exacerbating a nation-wide shortage. The Government, committed to stabilisation, refused to let the domestic price rise to reduce demand. L.J. Wild, the president of the Royal

Agricultural Society and a member of the National Council, advocated the dilution of superphosphate with serpentine or lime, and this was practised widely by the end of 1941. Nauru's ability to export phosphate rock had been seriously restricted by German raider attacks in December 1940, and supplies were likely to decline. In August 1941 the Council decided on rationing based on 40 per cent of annual usage, with a higher allocation for cropping. Following Japan's entry into the war, the British Phosphate Commissioners evacuated Nauru in February 1942, and imports declined sharply.



A.F. Ellis, *Ocean Island and Nauru*

Left and below *A cantilever was used at Nauru to load the phosphate into the Commission's ships. These photos were taken in the mid-1930s.*



A.F. Ellis, *Ocean Island and Nauru*

A.F. Ellis, *Mid-Pacific Outposts*

An Australian guard with a tommy-gun looks out over the cantilever jetty destroyed by German raiders in December 1940.

Fertiliser rationing was administered by the District Councils of Primary Production. The system was cheap, efficient and surprisingly uncontroversial, and led to the councils being given a wider role in rationing essential supplies, including fuel, rubber products and farm machinery. Motor spirits had been rationed from the outbreak of war, and supplies became increasingly restricted following the Japanese occupation of the Dutch East Indies. The Ministry of Supply's District Fuel Controllers received applications for fuel and sought recommendations on allocation from District Transport Committees, which usually included a district council representative. Many farmers felt that they were not getting a fair share of the fuel available, and from mid-1944 the district councils took over administration of the system in rural areas. Rationing continued until 1950 under district council control.

After the fall of Malaya in 1942, New Zealand's supply of rubber virtually dried up, and tyres, rubber hoses and tubing became almost unobtainable. The District Fuel Controllers allocated tyres as well as fuel. Farmers were entitled to tyres only for transport vehicles used between the farm gate and the nearest railway station and/or market. Administration of the system improved after the district councils took over rationing in 1943,

and some new tyres became available from the United States under the Lend-Lease Agreement.

While other rubber products essential to the dairy industry were supplied via Lend-Lease, gumboots were overlooked, and many farmers made their feelings known in no uncertain terms. The control and distribution of gumboots caused more trouble to both the Department of Agriculture and the Ministry of Supply than did any other commodity.

Many 'manpowered' workers without proper footwear were being directed into agriculture. In requesting 33,000 pairs of American-made rubber boots, the Department claimed that the lack of footwear was causing cases of rheumatism among women and older men. It was difficult to obtain leather boots because of the overriding demands of the military.

The first Lend-Lease gumboots arrived at the end of 1942, and everyone wanted them. They were allocated by a committee comprising representatives of the Departments of Railways, Public Works, Mines and Agriculture. Agriculture secured most of them, and distributed them to dairy farmers, flax workers, freezing workers and dairy factory employees. However, the distribution process was disorganised and many felt they had been disadvantaged.

The Department, frustrated at the amount of time spent on gumboots, including receiving both abusive telephone calls and leaky gumboots hurled at high velocity, persuaded the National Council of Primary Production to take over their distribution in mid-1944. This more effective form of allocation, and an increase in imports from late 1944, caused the issue to subside.

The country managed to increase agricultural output in many sectors during the war, despite shortages of most of the major farming inputs, including labour. A key factor was greater use of technology, especially farm machinery. Under the Lend-Lease legislation of early 1941, the United States supplied Britain and her allies with war materials without payment, on the basis that they were leased rather than sold. The countries involved set up reciprocal lend-lease systems to repay the United States. All machinery supplied had to be used for the war effort.

Farmers sought motor vehicles, agricultural machinery and fertilisers. The Department of Agriculture passed on orders to the Ministry of Supply, which ensured they conformed to Lend-Lease

specifications and then forwarded them to the Supply Mission in the United Kingdom. The list was matched against manufacturing capacity and forwarded to the United States. The goods were received in New Zealand by the Department of Agriculture, and allocated by the district councils.

The first major Lend-Lease shipments, which arrived in May

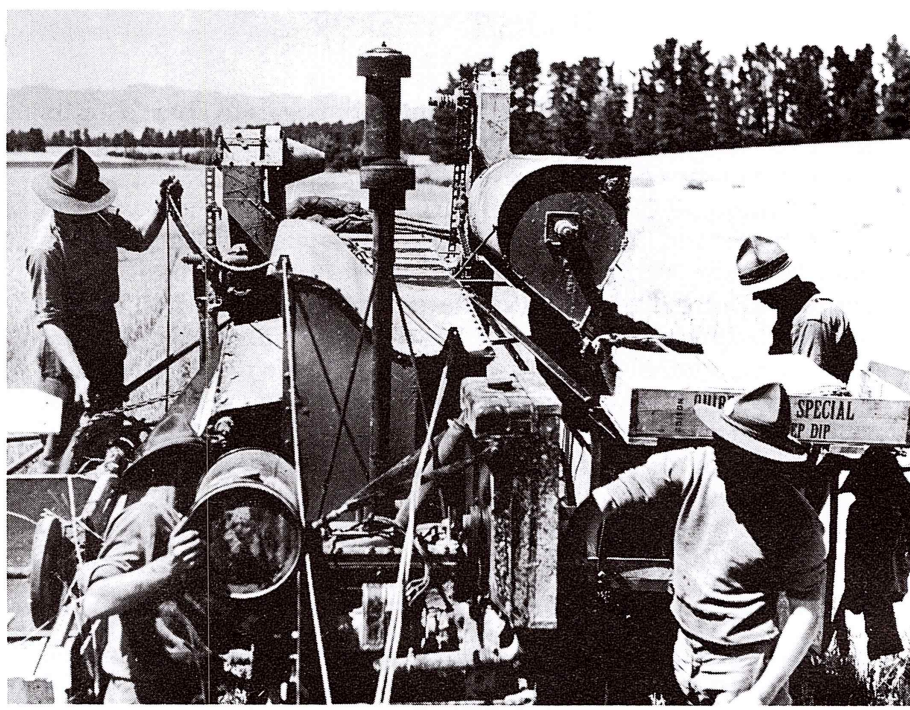
Alexander Turnbull Library, War Effort collection

Harvesting by the army began in Canterbury in 1942, when men were sent out to gather crops that would have rotted. The next year the district councils co-ordinated labour requirements under a more formalised scheme.

1943, included balers, binders, mowers, hayloaders, combine harvesters and tractors. In the second half of the war almost all tractors imported into New Zealand came under Lend-Lease. This arrangement was a vital factor in allowing New Zealand to maintain its agricultural production during the war.

The district councils also played an important role in informing manpower authorities of local labour needs and arranging the appeals of important farm workers against conscription. This work was vital from 1942 when the labour shortage became a crisis.

From 1942 a variety of schemes using military labour for harvesting were developed, initially in Canterbury. In some cases the army supplied men free and also fed them. Under a system



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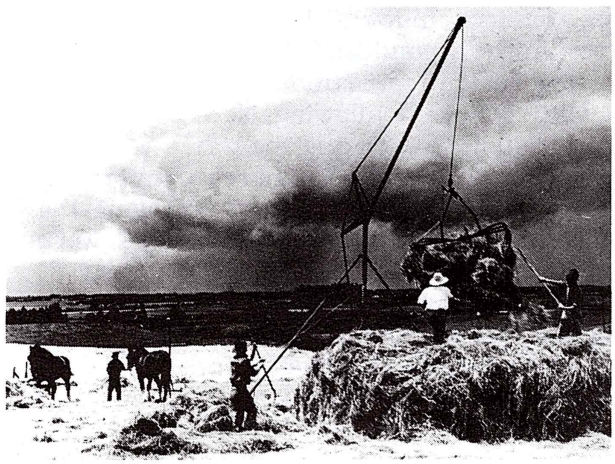
Soldiers were involved in a variety of activities. Most army agricultural workers helped to harvest crops on arable farms.



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Some soldiers were involved in haymaking. This farm's lack of mechanisation is clear from the horses and equipment in use.

adopted nation-wide in 1943, the military began to charge for its services, and the Fields Division had to extract payment for the work from farmers. This proved difficult.

The National Council of Primary Production had less work to do in the second half of the war, and Cockayne even called for its abolition. The Minister, however, saw its political value and it continued in existence until the end of the war, when it was abandoned by agreement with Federated Farmers. The Council had been a symbol of rural support for wartime measures rather than a means of controlling agriculture. Its very existence legitimated the Government's extraordinary powers. This situation was in stark contrast to the sectional in-fighting that had characterised relationships between producer groups and the Government between the wars.

The Services Vegetable Production Scheme

In the 1930s most New Zealanders grew their own vegetables. Market gardening was small in scale, and poor storage and transport facilities meant that local markets only were supplied seasonally. The family garden was outside the paid economy, and so was given only minor consideration in the preparations for war.

Certainly the Department of Agriculture had had limited involvement in market gardening. The Horticulture Division had focused most of its energies on developing an export orcharding industry. The only significant government involvement was the partial control of the marketing of potatoes and onions by the Internal Marketing Division of the Marketing Department. The Division had originally been set up to distribute dairy products to the local market. It was given responsibility for potato and onion supplies when shortages arose in the late 1930s.

In the first months of the war vegetables continued to be available in normal quantities, but as more women and older men were manpowered they had less time to garden. The efforts of market gardeners to expand production were inhibited by a lack of labour. Prices rose and shortages began to develop in late 1940. At the same time there was an increased demand from the armed forces, many of whose members were stationed in New Zealand. The problem was exacerbated by the expansion of the Home Guard and the calling up of territorials in 1942.

By mid-1942 it was clear that commercial growers would have difficulty meeting the demand. The Government began to look

Many women became vegetable gardeners for the duration of the war.

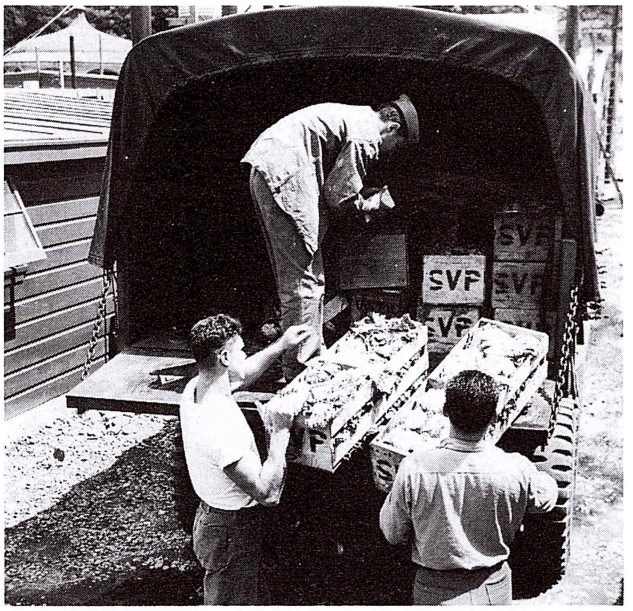
Alexander Turnbull Library

closely at vegetable production, and established a Vegetable Production and Marketing Committee.[9]

As a result of the Committee's work, the Minister of Agriculture proposed a scheme whereby the Department would take over the production and supply of vegetables to the armed forces in order to relieve pressure on the domestic market. The Food Controller, based in the Ministry of Supply, would tabulate monthly the military's requirements for vegetables. This information would be passed on to the Department of Agriculture, which would supply the vegetables in return for a reimbursement of its costs. The Department had to rapidly acquire the land, materials and

Alexander Turnbull Library, John Pascoe collection

Right *The SVP delivering vegetables.*



Alexander Turnbull Library, John Pascoe collection

Opposite *The scale of vegetable production during the war was far greater than anything the country had seen before. These cabbages were destined to feed US troops sent to garrison New Zealand.*

equipment needed to get the Services Vegetable Production Scheme started.

Earlier consultation with commercial vegetable-growers had established that they did not have the ability to increase their production on the scale required in the time available. The growers had no centralised organisation and lacked the financial strength to cover the risks involved in a contract with the military.

Given the shortage of artificial fertilisers, it was thought best to grow vegetables on soils that had been in pasture and had considerable built-up fertility. The Fields Division's instructors, spread throughout the country, were chosen to organise the scheme. The Division lacked experience in the marketing and supply of vegetables, but this was not seen as important because it was supplying directly to the armed forces.

The scale of the scheme was immense. The plan was to plant enough to feed 100,000 soldiers, who would consume 30 million lb of fresh green vegetables per annum. In addition, the Internal Marketing Division had signed contracts with growers for 16,000

tons of potatoes to supply the military. Such an operation would depend on considerable mechanisation.

In May 1942 Cabinet approved the project on the basis that it would be self-funding once establishment costs were met. Within a fortnight the military increased its requirements to 45 million lb for 150,000 men. It remained unclear whether this would be enough, given the huge numbers of United States troops arriving to train in New Zealand. The Department of Agriculture was

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The arrival of the Americans in New Zealand from May 1942 provided an enormous challenge for SVP authorities. Here US forces march to McKay's Crossing, north of Wellington.

increasingly frustrated by continual changes in requirements with little warning. Fields instructors could not be told where the US troops were to be stationed, which made it impossible to site Services Vegetable Projects (SVP) close by as had been envisaged.

The Department's officers organised the leasing of land, arranged one-year leases with a right of renewal, and provided compensation for the removal of hedges and fences. Farmers were assured that their land would be regrassed before it was returned to them. By the end of 1942, 1,723 acres had been leased,

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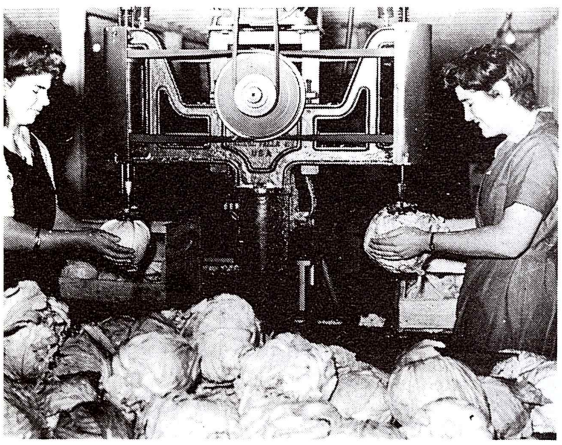
The chronic labour shortages of 1942 led the SVP to use Japanese POW labour. Experience showed that most prisoners and aliens were not keen to work and required constant supervision.

although delays caused by labour shortages and lack of machinery meant that much of this land was not in full production. The SVP delivered the vegetables to the local military camp or to the nearest railway station for transport further afield, and were paid a 'fair market price' for the produce.

While the Americans' arrival diminished a large stockpile of meat and dairy products, which had accumulated because of a lack of shipping, it also stretched the SVP to breaking point. When



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Left, below and opposite *Vegetables were dehydrated before being sent to American troops in the Pacific. These workers are coring cabbages, which were then shredded before dehydration.*

Alexander Turnbull Library, War Effort collection

in August 1942 the Americans put in a request for vegetables that would have entailed planting another 4,000 acres, the SVP officials baulked and made it clear that it was not possible to expand production any further in the current season. The SVP was not yet even adequately supplying vegetables to New Zealand troops – 60 per cent of the vegetables consumed by the armed services in 1942 were grown under contract by market gardeners, and much of the remainder were grown on military bases. The American request made it clear that they had not co-ordinated

Alexander Turnbull Library, War Effort collection

their purchasing with the New Zealand military authorities. The SVP's conservative approach proved justified, as troop numbers

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Workers loading lettuces stamped with the initials 'IMD'. From mid-1943 the Internal Marketing Division of the Marketing Department let contracts for the supply of vegetables. A lack of co-ordination between the SVP and the IMD led to a glut, which put the two organisations in direct competition for markets.

never reached 150,000 but peaked at 120,000 in April 1943.

Production increased rapidly in 1943 to meet the requirements of US troops in New Zealand and the Pacific. This necessitated a complete rethink of the operation, and the Internal Marketing Division became involved in the canning, dehydration and shipping of vegetables. For 1943 some 18 million lb of vegetables was required for New Zealand troops, seven million lb for American troops in New Zealand, and a further 70 million lb for American troops in the Pacific. Cabinet authorised an expansion of production and the building of three dehydration plants, a canning and a freezing facility.

Great efforts were made to meet the American demand, but by the end of October 1943 it was clear that this was impossible. While 5,239 acres had been leased, less than 1,000 acres was under cultivation. To fill the orders would have required 6,000 acres, but there was no point in increasing the area cultivated in view of serious shortages of seed, labour, fertiliser, machinery and processing facilities. Fortunately, commercial growers contracted to the SVP were able to supply a third of its output. It was not until 1944, when the SVP's production doubled, that the shortages were overcome.

The SVP's difficulties had led to the Internal Marketing Division making its own contracts with growers. Animosity and competition now developed between the two organisations because of their overlap of functions. By 1944-45 the shortages had turned to surpluses, and in this situation the IMD had a crucial advantage; it could reject SVP vegetables for reasons of quality or an inability to sell them. The IMD first rejected a greater proportion of produce, and then refused to accept any vegetables at all from the SVP. The sight of vegetables rotting in the field became a political issue and led to considerable criticism by growers and others. By 1944 most instructors wanted the Fields Division to return to its previous role as an advisory organisation and relinquish wartime production measures for which there was by now little need. Many felt that their relationship with pastoral farmers had been damaged by their involvement with the SVP.

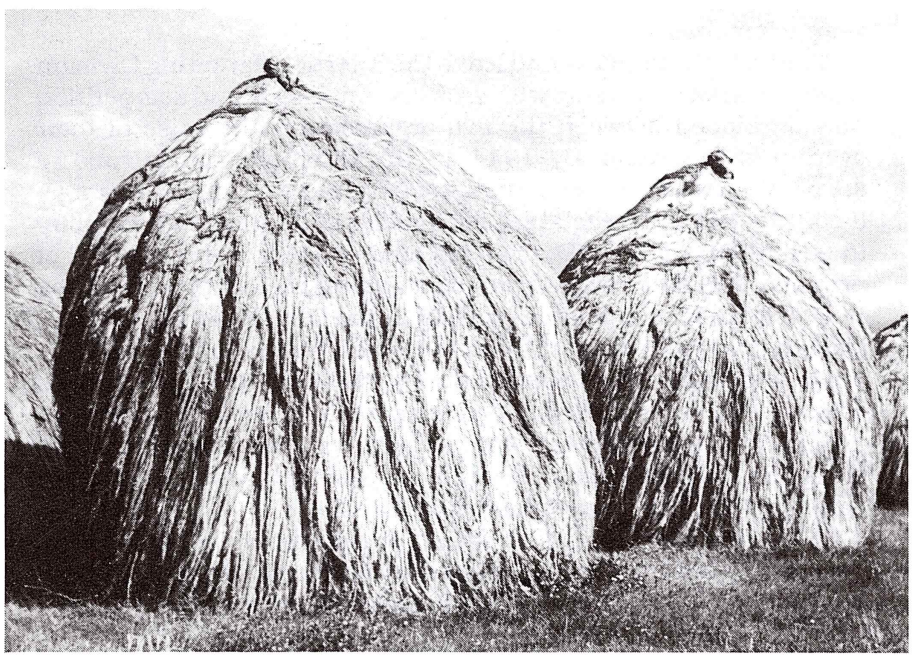
It was decided in mid-1944 that overall responsibility for the supply of vegetables should be given to the Marketing Department. Many SVP sites were closed down at once, and the entire project was terminated at the end of 1946.

The SVP had cost £406,000, and a further £206,000 was spent on returning land to its original condition. A government-run growing programme had been needed to increase vegetable production rapidly, but it was unfortunate that there was no higher authority co-ordinating supply during the period of over-production in 1944-45.

Linen Flax

During the Second World War the Government fostered the production of linen flax in order to supply the United Kingdom with fibre. The attempt to create a viable export industry proved a costly failure.

New Zealand had begun to investigate the growing of linen flax in 1936. The Fields Division of the Department of Agriculture had carried out trials under the overall control of the Agronomy Division of the DSIR.[10] After a hesitant start it was demonstrated



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Right *In wartime women took on agricultural tasks formerly done by men. This worker is pitch-forking linen flax from a stack.*

Opposite *A stack of native flax used for rope making. Similar stacks of linen flax became a familiar sight on the east coast of the South Island.*

Alexander Turnbull Library, John Pascoe collection

that linen flax could be produced on the east coast of the South Island.

In 1940 the British Ministry of Supply began seeking new sources for the linen flax that had previously been supplied from within Europe. It offered New Zealand a good price for the production from 25,000 acres of linen flax. This was a formidable challenge: only 5,000 acres had been grown in 1939. A Linen Flax Management Committee comprising representatives from the Fields Division, the DSIR, other government departments and rope and twine makers was set up.

The rope and twine manufacturers were not interested in taking on a project of this scale. It was decided that 15,000 acres at most could be planted for the 1940-41 season. The aim was to take advantage of wartime circumstances to nurture an export industry.

It was a considerable undertaking. The project was under the overall management of the Department of Industries and Commerce. The DSIR was responsible for developing processing techniques, while the Public Works Department built the factories and Railways supplied the machinery. Harvesting and processing equipment had to be improvised. The Fields Division arranged contracts with farmers close to the designated factory sites, of which there were eventually 17 between Blenheim and Otautau.

John Woodcock describes how farmers were persuaded to co-operate:

> Bob Tennent, our Director, explained the programme to the South Island field officers at a meeting in Christchurch....
>
> The relevent [sic] officers at each centre would be required to get farmers to grow the necessary acreage, arrange contracts, distribute the seed, give advice regarding the cultivation, and supervise the harvesting which would be done by contractors using special pulling machines fabricated for the job....
>
> We looked at each other in shocked amazement. It was then the middle of June; the crops would need to be sown by October or early November....
>
> Then Tennent gave us some good news..., 'I will come down and address meetings in each district and explain the programme we have in mind....'
>
> We smiled knowingly at each other. Good old Bob, the orator, the man with the silver tongue, the persuader who many people said should have been a politician, his presence at a meeting should draw a capacity crowd.
>
> Our first meeting in Otago was at Balclutha. By the time he arrived there he had already addressed several meetings in Marlborough and Canterbury so he was in good form....
>
> It was a wet, grey afternoon, unsuitable for farm work, so the hall was full of farmers from a wide area round Balclutha when [he] started his Otago talks by outlining the grave position Britain and her Allies, now only the Commonwealth countries, were in ....
>
> The audience had already been aware of this preamble, but Tennent spoke clearly and dramatically and when [he] was in his best form people sat still and listened, nobody coughed, you could 'hear a pin drop'.
>
> After a pause to let the gravity of his words sink in, he continued. The British forces had lost a good deal of equipment in their evacuation from Dunkirk, and one of those items which we in New Zealand had been asked to produce to make up for some of those losses was flax fibre.

> Hitherto this material had been supplied largely from Holland now in enemy hands....
>
> He explained that the linen fibre would be used for such things as web equipment for the infantryman, canvas and ropes for the Navy, parachute harnesses for the airmen and even fabric wings for some light aircraft. There would be many other uses such as firehose. He spoke prophetically when he said 'Nazi bombers have already razed Rotterdam. Firehose may become more important than bullets for a while and I fear for cities in Britain if that kind of warfare continues' ....
>
> He closed by saying, 'I'll get Mr. Greenall, your district Instructor, to pass round paper, and I want you to write down the acreages you're willing to grow. Then he will visit the farmers concerned about definite contracts. I would like 1,200 acres to be promised at this meeting today'.
>
> Then began one of those sessions intermediate between an auction and the modern telethon. As the papers were handed in to Greenall and the acreages totalled, Tennent urged the audience, 'Come on: we've only got 900 acres promised so far. We want offers of 1200 acres this afternoon'.
>
> Eventually, after a good deal of such persuasion, the total reached 1,100 acres and the meeting closed on a note of satisfaction, the large majority of farmers, even those unable or unwilling to grow the crop, had enjoyed themselves.[11]

Neither the Department of Agriculture nor the DSIR was willing to assume the major responsibility for linen flax production. Both feared being diverted from their central functions, and the former was concerned that involvement in a commercial operation might harm its relationship with farmers.

In 1940 some 14,000 acres of flax was planted and 11 factories were built. Harvesting machinery was in short supply. Much of the crop in Otago and Southland was harvested only after a plea for help from the general public, who responded by spending their weekends pulling the flax by hand. It then sat in stacks for several months awaiting transport to a factory, and finally nearly 30 per cent of the crop was rejected because the fibres were too short or mixed with too much weed.

Alexander Turnbull Library, John Pascoe collection

Left *Women and men ineligible for military service made up the bulk of the workforce in linen flax factories.*

Below *Linen flax at the Geraldine factory.*

Alexander Turnbull Library, John Pascoe collection

In all, 22,000 acres was planted in the 1941-42 season, and six more factories were built. The pricing system had been designed to give farmers growing the new crop some security. No incentives were built in for fibre content or length of fibre, these being unrealistic in the circumstances. This meant in practice that profits could be maximised by growing the crop and then abandoning it. Incentives for producing a high-quality crop were now introduced. These, together with favourable growing conditions, meant that much more flax was grown than could be processed by the labour force available. Processing costs were also much higher than had been anticipated. It was becoming apparent that the exercise was uneconomic.

In 1942-43 farmers produced more than 51,000 tons of flax, which remained in stacks for months. Net losses of £81,000 for the season brought total losses to £251,000. The industry was clearly unsustainable in the long term.

The weakness of the industry's divided management structure became increasingly evident from mid-1943. It was by now obvious that New Zealand could not compete with Australian and Canadian production. The Linen Flax Management Committee recommended that the Government form a board of directors to take financial control of the operation and undertake the drastic rationalisation necessary. The Department of Agriculture experienced considerable frustration over the Cabinet's failure to resolve the situation. Fields instructors continued to arrange the growing and inspecting of crops even though most considered that the industry should be allowed to die. In 1945 the Government decided to accept the Linen Flax Management Committee's recommendations to reduce production, but not before many contracts had been signed for the 1945-46 season. The resulting £222,000 loss brought the cumulative loss to £525,000.

The Department of Agriculture withdrew from active involvement in the industry when the Linen Flax Corporation was at last established in December 1945. Its officers had become increasingly uncomfortable with their unfamiliar entrepreneurial role. Many contracts had not gone well, and considerable farmer suspicion had developed. Fields instructors felt that their independence had been compromised to the point that their integrity had been brought into question. The Department was

pleased to sever its connection with an experiment which had clearly failed. The cautious approach it had shared with the DSIR had been vindicated.

Chapter 5

From Department to Ministry

Pastoral Industries Since the War

New Zealand's access to the British market remained unrestricted after the war; indeed, until 1954 the United Kingdom bought all New Zealand's exportable meat and dairy produce.[1]

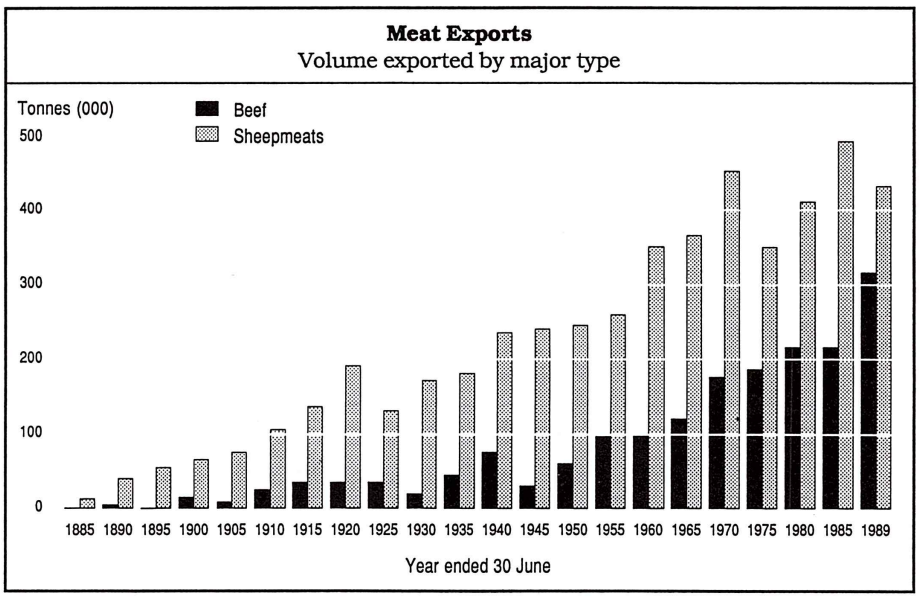
Maximising agricultural production had been a responsibility of the Department since its inception, and this role had grown between the wars. It had gained a new dimension in 1938, when the Government imposed import licensing and exchange controls.[2] These measures were a substantial enhancement of the Government's powers and remained a strong, if controversial, tool of economic management in the post-war period. The Department of Agriculture's role in fostering agricultural production, and hence exports, became increasingly important to the economic health of the country.

The volume of meat, wool and dairy production continued to increase throughout the 1950s and 1960s. The dairy industry had grown enormously between the wars, and during the 1950s sheep and beef farming on hill country was boosted by the advent of aerial topdressing. By the mid-1960s both wool and sheepmeat production had more than doubled since 1939,[3] while wool had become the most important source of income for farmers, providing up to 30 per cent of gross farming income compared with 13 per cent just before the war. Dairying became less dominant in farm returns in this period, with its share of gross farm income falling

from 41 per cent in 1938-39 to 29 per cent by the mid-1960s.[4] Beef production also grew dramatically to more than three times that of 1938-39 by 1972; much of it was exported to the United States. Dairy production, by comparison, was 50 per cent above pre-war levels in the late 1960s.

The market for dairy products has long been heavily influenced by the protectionist policies of the European Economic Community (EEC, now the European Community or EC). British butter prices were first seriously undermined during the 1956-57 season by European producers 'dumping' butter at prices below the cost of production. This practice eventually led to quotas being imposed on New Zealand butter in April 1962,[5] the forerunner of a comprehensive quota system intended in the long term to reduce New Zealand's exports to the United Kingdom.

The increased volume of exports and rising nominal prices disguised the fact that real prices for pastoral products were



New Zealand Official Yearbook, 1990

Sheepmeats overwhelmingly dominated meat exports until the Second World War. Beef production grew dramatically in the post-war period.

tending to fall from the early 1960s, and that traditional products were less profitable to farmers than they had been.[6] The entry of the United Kingdom into the EEC meant that market access for New Zealand would become more difficult, while prices would be strongly influenced by the dumping of European pastoral products on the world market. The weakness of New Zealand's position became apparent when the oil crisis of 1973 led to a major balance of payments problem which proved intractable. The response by farmers to the decline in returns was to stop developing traditional farming and start diversifying into deer and goat farming, and horticulture, particularly kiwifruit and apples.

Kiwifruit exports developed from the mid-1970s, and returns were high for much of the next decade. By 1980 approximately five million trays were being exported annually, and by 1991 some 67 million trays.[7] Real prices reached a peak in the early 1980s and have since fallen by about 70 per cent; the industry is no longer expanding. Apple production also grew throughout the 1980s, and while that growth has been less spectacular than that of kiwifruit, prices have been more stable. In 1980 fewer than 50,000 tonnes were exported; by 1991 the figure was 210,000 tonnes.[8]

Real prices for sheepmeat and wool continued to decline in the 1980s, although returns to farmers were bolstered by the

Kiwifruit production boomed in the 1980s, but declining returns in the early 1990s have led to stagnation.

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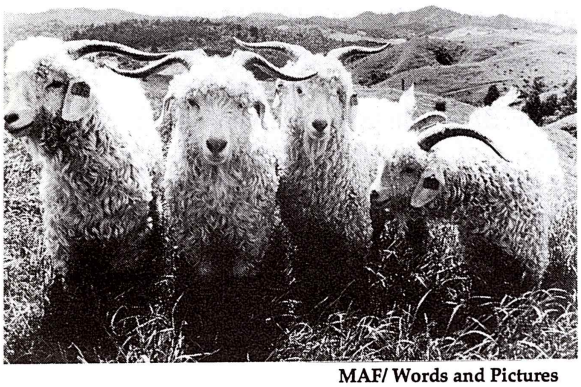

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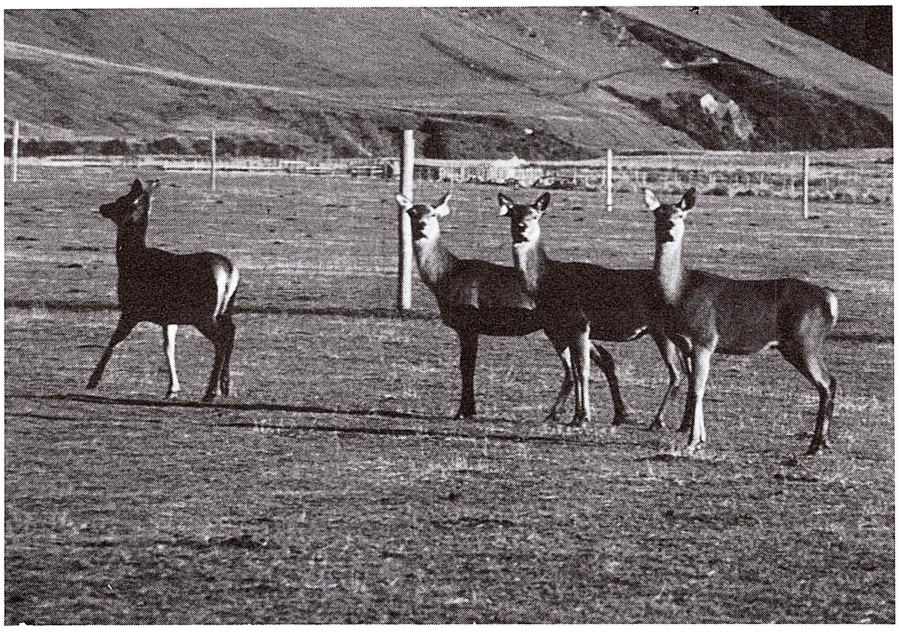
Left and below *Deer and goat farming developed from the early 1970s.*



MAF/ Words and Pictures

Supplementary Minimum Price Scheme (SMP) between 1978 and 1984. Since its removal, sheep numbers have dropped to 56 million – 15 million fewer than in the early 1980s – and may well drop further.[9] Dairy and beef production has remained fairly

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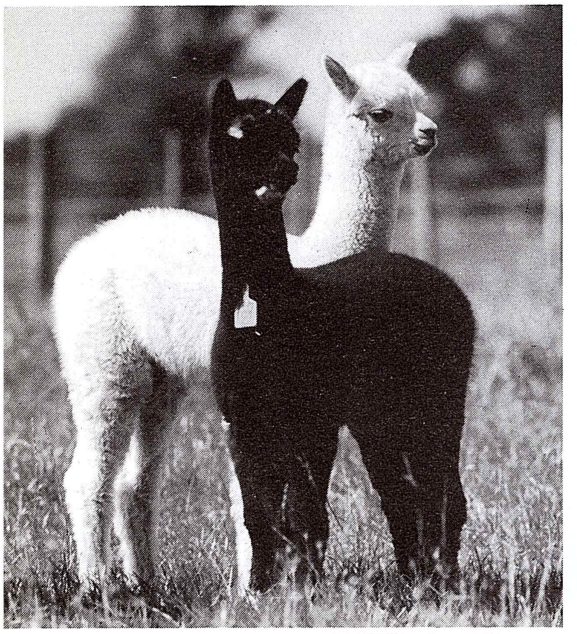
Agro-forestry was a feature of diversification in many regions.

static in the last decade. Beef cattle numbers have been around 4.5 million since the removal of SMPs in 1984. This compares with a peak in the early 1970s of slightly over six million. Dairy cattle numbers vary between 3.3 and 3.5 million, a decline from the peak of nearly 3.8 million in 1969, although production per animal has increased slightly since that time.[10]

After negotiations spanning more than a decade, the United Kingdom finally joined the EEC on 1 January 1973. Subsequently, New Zealand has successfully maintained a considerable, if shrinking, share of the United Kingdom market, while recognising the need to find other export markets. Now Great Britain is only one of half a dozen major destinations for our agricultural products. After 1973 the New Zealand economy diversified and other primary, manufacturing and service exports grew. Two of the most important growth areas were forestry and fishing. In the mid-1960s agriculture provided 80 to 90 per cent of exports; by the late 1980s the proportion was 50 to 65 per cent,[11] although



MAF/ Words and Pictures

Left, below and opposite *Some of the more exotic breeds researched by MAF Technology in the late 1980s included alpacas, samba deer, and water buffalo.*

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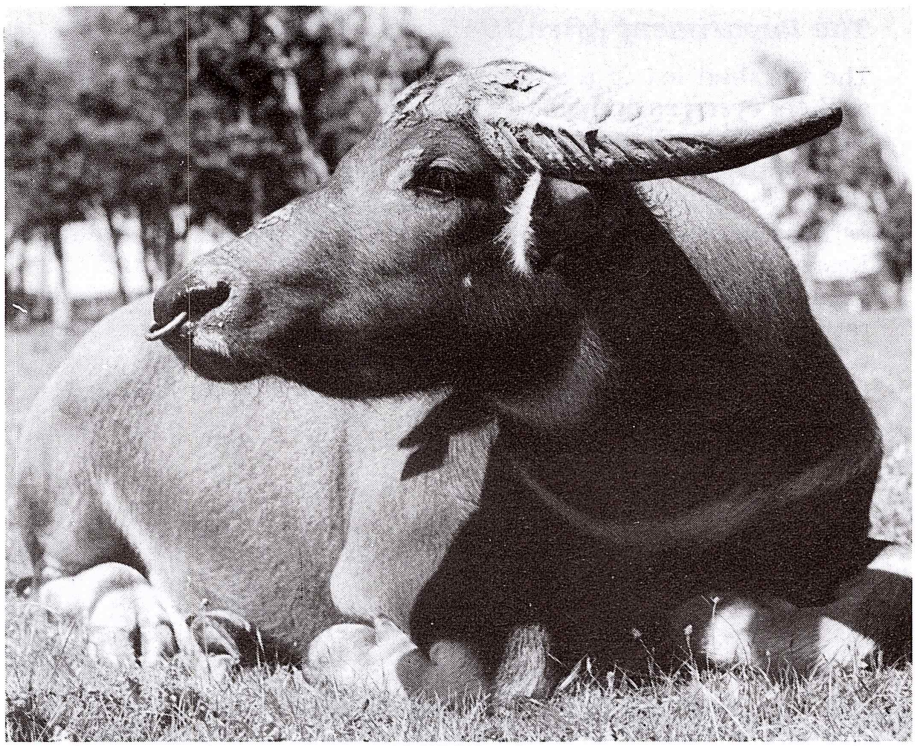

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diversification, and the growth in forestry and fishing exports, meant that primary industry still provided the vast bulk of the country's export receipts.

While agricultural exports are still of considerable importance, agriculture's position within the economy has changed since the war. Farm production comprised about 30 per cent of GDP in the late 1930s, 14 per cent in 1966 and 6 per cent in 1989.[12] When processing and associated industries are added to this most recent figure, agriculture's total contribution is nearly 13 per cent of GDP.[13] This change in relative importance reflects the more rapid growth of other sectors of the economy.

The Department After 1945

The war had led to a running down of the Department, with soldiers overseas and officers involved in wartime activities that were at odds with their peacetime roles. In 1945 there were 1,129 staff, with only 148 in the Fields Division. By 1950 the total had risen to 1,769, with the greatest increases in the Fields Division (which became the Extension Division in 1948) and the Animal Research Division. In the post-war period there was a return to a gradual extension of the Department's functions rather than any radical departure. The Director-General, E.J. Fawcett, outlined the Department's goals in his 1946 annual report. Its fundamental role was to increase production to earn overseas funds. He

Ruakura

While most hill-country land was cleared between the wars, a considerable amount was brought into production after the Second World War. Tractors and heavy machinery were more likely to be used.

highlighted several areas, particularly the continuing spread of improved pasture management to land still farmed using traditional methods. Specifically, he wanted farm advisers to work in association with landowners developing scrubland in the Auckland and Northland districts. In the South Island, the Department would help farmers develop irrigation to increase production. The continued drainage of swamps would provide more fertile land. Finally, he saw a need for the Department to focus on hill-country management techniques to improve fertility and contain erosion.[14]

The Rural Development Division and the Fields Division were amalgamated in 1948 to form the Extension Division. (This was renamed the Farm Advisory Division in the early 1960s.) Throughout the 1950s the Department had five divisions: Extension, Horticulture, Animal Industry (Livestock until 1953), Animal Research, and Dairy.

In the immediate post-war period the Fields Division greatly expanded its network of research facilities, particularly in the South Island. A soil fertility station was set up at Rukuhia, near Hamilton, in 1946. This focused initially on ways of raising soil fertility on land deficient in trace elements. A research station investigating irrigation was established at Winchmore, near Ashburton, in the late 1940s. In 1949 the Department acquired Invermay, near Mosgiel, as a general research and demonstration farm for land typical of the far south. Much of it was hill country in need of development.

Fawcett's aim of increasing production was given a considerable boost in the late 1940s with the development of the aerial topdressing industry. In response, the Department shifted its efforts in advisory services and research towards hill-country farming. A hill-country research station was established at Whatawhata, near Hamilton, in 1949.

The Department clashed with the Soil Conservation and Rivers Control Council (SRCC), which had been set up in 1941 to reduce erosion, amongst other activities. Soil conservators attached to the Council worked within the Public Works Department, while the Extension Division undertook research on soil fertility and gave advice on improving grass cover. The Department felt strongly that the soil conservators duplicated services it already supplied and overstated the extent of erosion. As a result of this

Ruakura

Left and below *The Department encouraged irrigation in the South Island.*

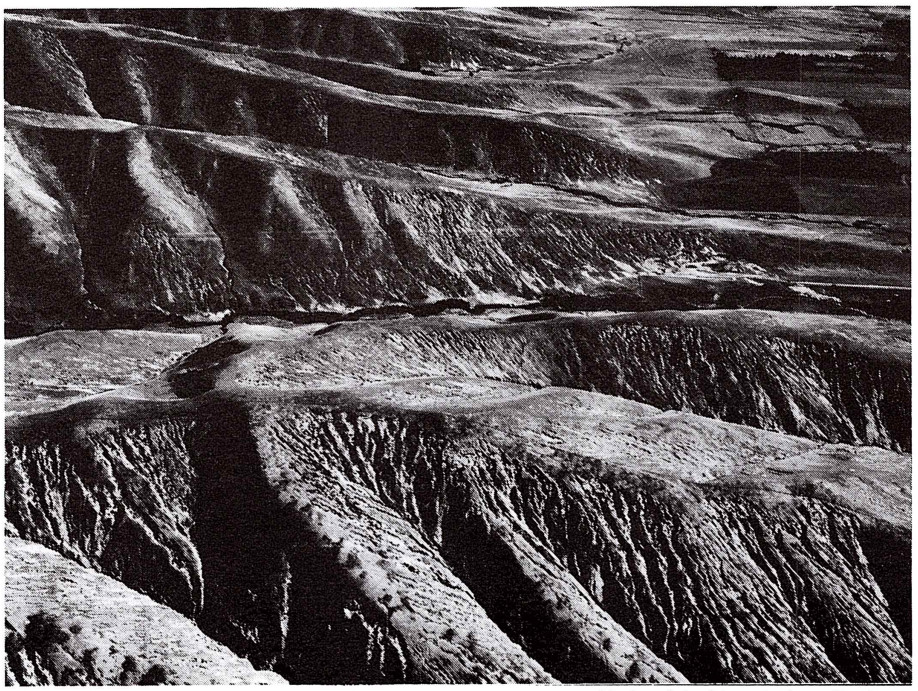
MAF/Words and Pictures

Ruakura

From early on it was found that the greater manoeuvrability of small aerial topdressing planes gave them an advantage over larger craft on most country. It did not take long for fliers to develop efficient loader machinery.

squabble the soil conservators were briefly transferred to the Department of Agriculture in the late 1950s.[15] However, they returned to Public Works because of tensions between the work of the conservators and extension officers, and because of difficulties the SRCC had in co-ordinating officers split between Public Works and Agriculture.

The Horticulture Division had grown steadily until the late 1920s, but slowly thereafter. Plant research was now undertaken by the DSIR, and the apple industry had stagnated after the boom of the 1920s. There was some development of the hops and tobacco industry in Nelson, but this was overshadowed by the general expansion of pastoral farming. In 1961 border protection,



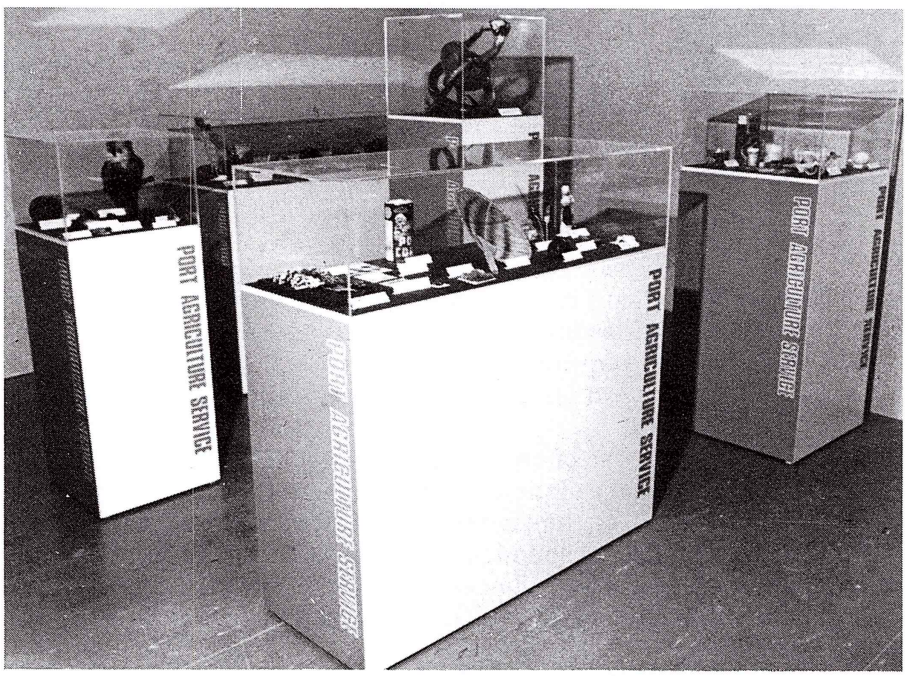
National Archives, MAF collection

Land use in some areas of the country caused considerable erosion and degradation. In the 1950s the Department felt that the problem was overstated, although it accepted that some regions such as Marlborough needed help in developing new land management strategies.

which had been a major part of the Division's work, was reorganised, and the work of the Horticulture and Animal Industry Divisions was co-ordinated by the new Port Agriculture Service.

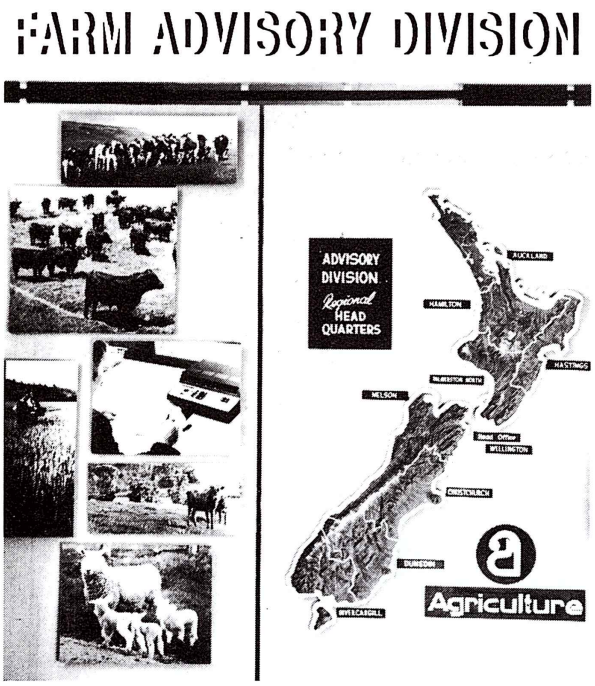
The Livestock Division was renamed the Animal Industry Division in 1953. The new name reflected a shift in emphasis from diagnostic and reactive work to a pro-active stance. Disease eradication schemes – particularly those concerned with tuberculosis, brucellosis and hydatids – developed considerably from the 1950s. In 1963 the Division was subdivided into a Meat Division with responsibility for meat inspection and the enforcement of hygiene and export regulations, and an Animal Health Division concerned with the control and eradication of disease.[16]

The Animal Research Division had existed since 1939, with centres at Ruakura and Wallaceville. In 1960 it was disestablished and each research facility was treated as a stand-alone unit. This proved unsatisfactory, and in 1964 all the Department's research facilities, including the research stations under the Farm Advisory Division, were grouped together in a single Research Division which also took over the field experimental and biometrics sections of the Farm Advisory Division. The tradition that the DSIR engaged in plant research and the Department of Agriculture in animal research was now breaking down. The Department of Agriculture developed a much wider research base in the mid-1960s, although its research was still largely complementary to that of the DSIR.



Ruakura

The Port Agriculture Service, established in 1961, combined the border protection work of the Horticulture and Animal Industry Divisions.



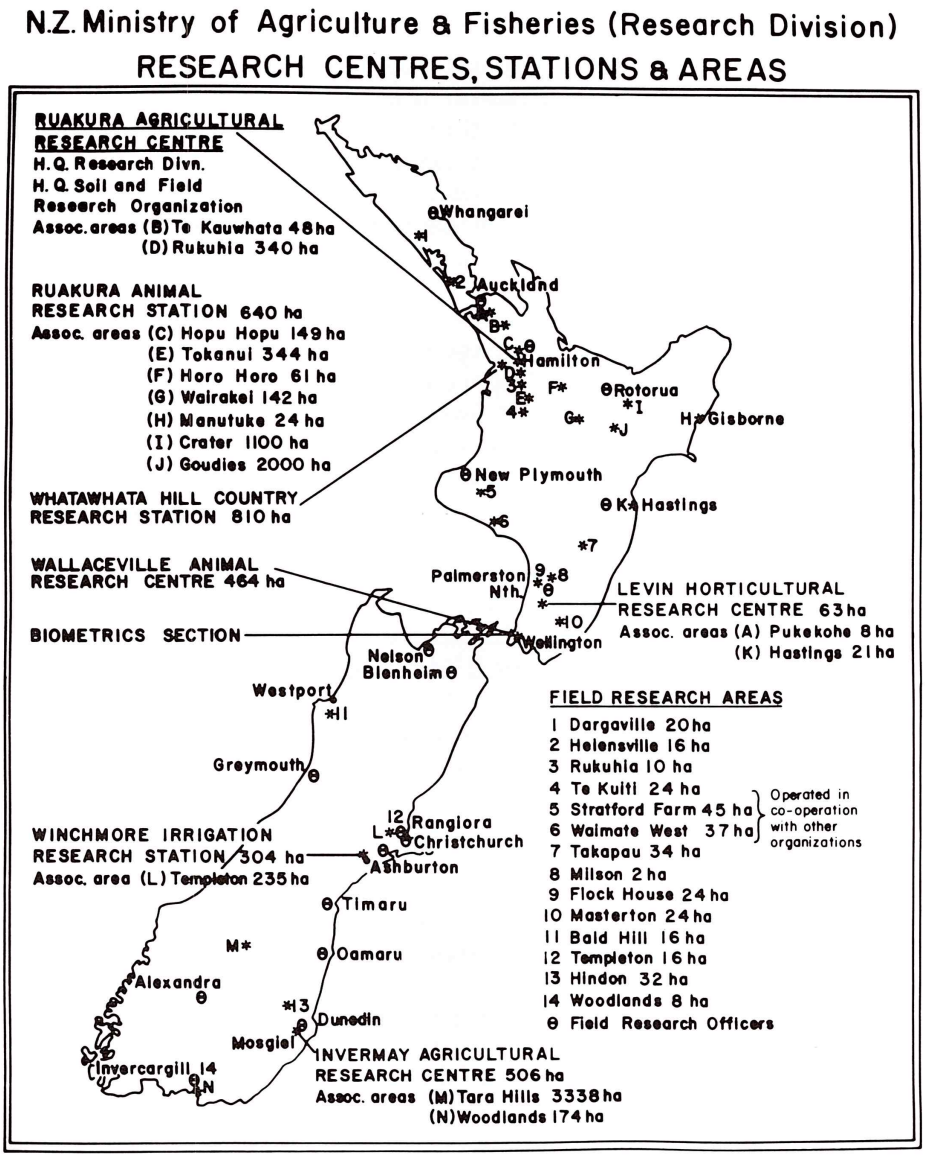
Ruakura

The Extension Division was renamed the Farm Advisory Division in the early 1960s. The Division was decentralised and had staff throughout the country.

The Dairy Division continued to focus on the quality of dairy produce. New standards were needed for a widening range of dairy products, while requirements changed as technology was developed and governments sought to reduce imports, often for economic reasons.

The increasing use of chemicals and pesticides in agriculture had led to the passage of the 1959 Agricultural Chemicals Act and the establishment of the Agricultural Chemicals Board, which registered agricultural chemicals and controlled their labelling.[17] As a result of growing concern, particularly with DDT, the Department formed an Agricultural Chemicals Section attached to head office.

In 1967 a small Sheep and Wool Division to advise on breeding and flock management was created. This move reflected the



Ruakura

By the 1980s the Ministry had a large number of research facilities around the country.

greater importance of sheep and wool in farming returns in the 1960s. The role of the Division was largely advisory, and its officers worked closely with those of the Farm Advisory and Animal Health Divisions. The Sheep and Wool Division was reabsorbed by the Farm Advisory Division in 1970. In the same year a separate Economics Division was formed to examine the impact of government policy on agriculture and to help implement assistance programmes.

As part of a general restructuring of government departments in 1972, the Fisheries Management and Fisheries Research Divisions of the Marine Department were combined with the Department of Agriculture to form a Ministry of Agriculture and Fisheries. At the same time an expanded Advisory Services Division took over the Horticulture Division, on the grounds that an increasing number of pastoral farmers were diversifying into horticulture. The new Ministry had eight functional divisions: Advisory Services, Animal Health, Dairy, Meat, Economics, Research, Fisheries Management and Fisheries Research.

Between 1972 and 1984 the structure of the Ministry remained largely unchanged, although in 1980 the information and biometrics sections were amalgamated into an Information Division, which co-ordinated publications and began the *Aglink* series. The new Division helped television and radio to produce rural programmes.

Fisheries

The incorporation of fisheries management and research into the Ministry of Agriculture and Fisheries in October 1972 made sense, since both agricultural and fisheries management were based on a close association with industry, and both maintained a body of research scientists vital to development. But there were also considerable differences. Fisheries remained an under-developed resource, while pastoral farming was long-established and had by this time reached a highly productive level. Rights of access to fisheries were also much more complicated than those to land.

The Marine Department was set up in 1866; the department gained responsibility for marine fisheries with the passing of the 1877 Fish Protection Act.[18] While some early legislation was designed to facilitate the growth of the industry, for example the

1885 Fisheries Encouragement Act, the predominant emphasis was on protecting resources from depletion. Fisheries belonged to the Crown, but with a limited and ambiguous recognition given to Maori rights.[19] Responsibility for enforcement in this early period rested with the Customs Department and the Police.

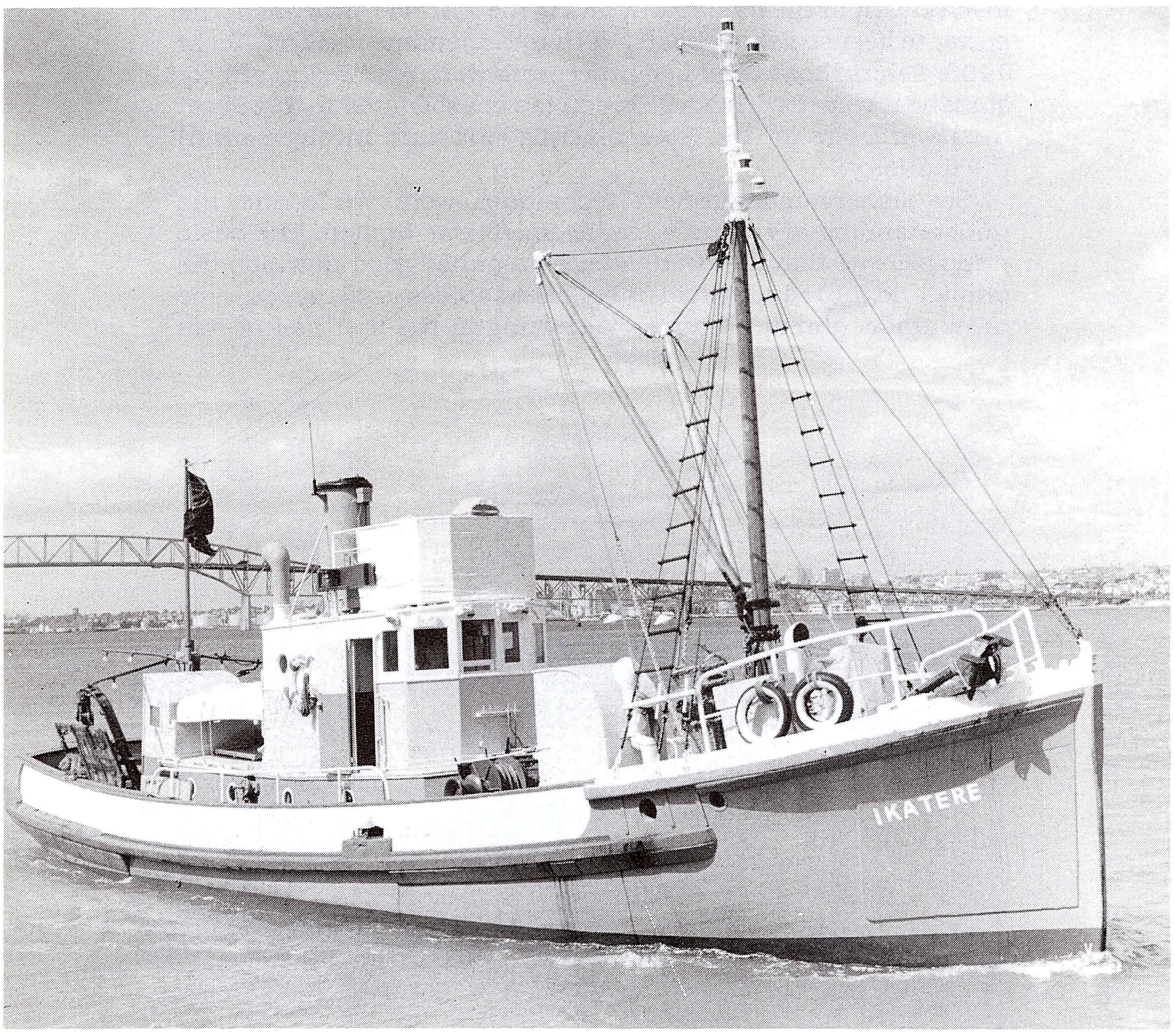
The 1894 Sea-fisheries Act began a process of direct government involvement in the industry by giving the Marine Department the power to license fishing boats. With the amendment of this Act in 1903, fishing boats and fish processors were required to supply statistical returns. This legislation (as consolidated in 1908) set the parameters for the Government's long-term involvement in the industry.

Sea fishery management techniques were crude and the understanding of resource management was limited. The basic principle was that fish were seen as a public good to which the public and the industry had unrestricted access until the resource came under threat. Commercial fishing in the first half of this

MAF Fisheries Library

The Auckland fleet of mulleters early in the century.

century was concentrated on a small number of inshore fisheries. Resources were not depleted, however, with the exception of the northern rock oyster fisheries, which were largely destroyed by the 1930s. It seems likely that fishers had their own informal



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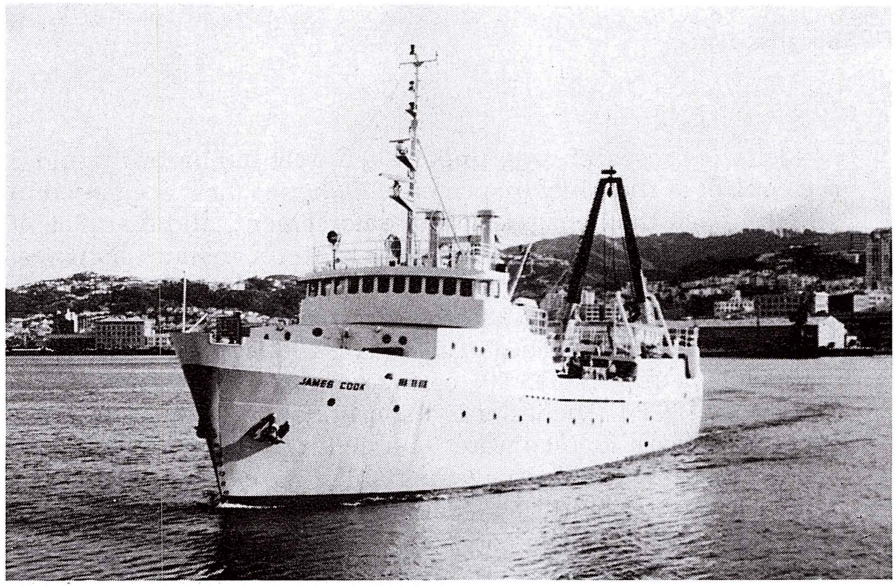
The Ikatere, *1939-1981.*

methods of conservation. Recent thinking suggests that depletion is only likely to occur if access is open to newcomers and fishers act competitively, against the interests of the fishery as a whole.[20]

Until the 1920s the steady expansion in fishing was generally sanctioned by the Marine Department. Where the department felt that depletion was occurring, it intervened with restrictions on licences, closed areas and seasons, and limits on mesh size. This was usually in response to pressure from local fishers rather than as the result of research. When A.E. Hefford replaced L.F. Ayson as Chief Inspector of Fisheries in 1926, the approach shifted to conserving resources. This was based on the assumption that inshore fisheries were close to being fully exploited. This attitude was supported and endorsed by the 1937-38 Sea Fisheries Investigation Committee, which recommended that inshore fishing be restricted, and was strengthened by the establishment of a restrictive licensing policy, initially under the Industrial Efficiency Act of 1936.[21]



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The James Cook, *1969-1990.*

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The Tangaroa, *1991-.*

Fisheries research was undertaken only haphazardly under the control of the Chief Inspector of Fisheries (first appointed in 1899). It was the poor relation of enforcement, and insufficient data was available to ascertain the state of inshore fisheries. Systematic trawling was begun after the Second World War by the research vessel *Ikatere* (1939-81). Extensive study of fish stocks on the continental shelf began in the late 1960s with the purchase of the *James Cook* (1969-90), and is now being continued by the *Tangaroa* (1991-). The latter is the first fisheries vessel with the capacity to work in deep water to a depth of 2,000 metres.

For much of the century the fishing industry supplied the domestic market, and New Zealanders' limited tastes inhibited its development. Cheap meat was more attractive. Very little state assistance for the development of fishing was forthcoming until the 1960s. Both the 1937-38 Sea Fisheries Investigation Committee and a 1956 National Government caucus investigation

opposed any export trade that might push up domestic prices. In 1937 more stringent licensing provisions were adopted and about a dozen enforcement officers were appointed; their number remained at this low level until the mid-1960s.

Inshore fisheries developed only slowly.[22] The crayfish boom which began in the early 1950s provided the first major seafood exports[23] and encouraged assessment of other potential exports. Japanese commercial fleets began to exploit fisheries outside the three-mile zone in the late 1950s, largely in deeper waters not fished by New Zealanders.

In the late 1950s there was a groundswell of opinion within the industry that fishing was over-regulated and did not need to be managed so conservatively. This led to the creation of a select committee in 1961, and resulted in the Fisheries Amendment Act of 1963. The industry was largely deregulated and new fishers were encouraged to enter it. A Fishing Industry Board was set up to promote and oversee the fishing industry in much the same fashion as the producer boards in the pastoral sector. At the same time a Fisheries Research Division was set up within the Marine Department, with most scientists being placed under a Director of Research. By the late 1960s the Division was large enough to undertake long-term research.

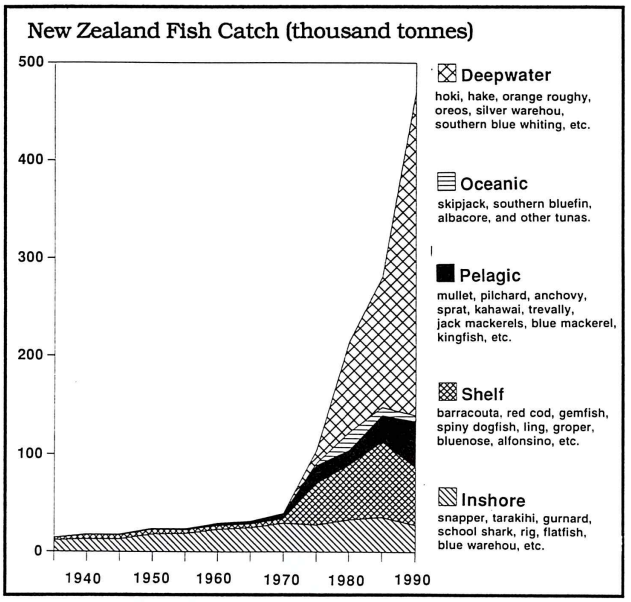
In response to Japanese incursions into inshore fisheries in 1966, the Government declared a 12-mile fishing limit as part of

MAF Fisheries Library

The Fisheries Research Division offices in Wellington in the late 1970s.

its policy of developing the New Zealand industry. The move attracted considerable protest from Japan, and a compromise was reached whereby Japanese fishing was to be phased out over five years.

In the mid-1960s there was significant investment in fishing and major companies began to form. Initial forays into deep-water fishing by New Zealand companies proved uneconomic, and the expanded fishing fleet concentrated on the familiar inshore fisheries. In the 1970s exploitation of the continental shelf began in earnest, and from the mid-1970s deep-water fishing off the continental shelf was undertaken.



Growth in fisheries in the 1970s and 1980s came more from greater exploitation of deep-water species than from increased inshore fishing.

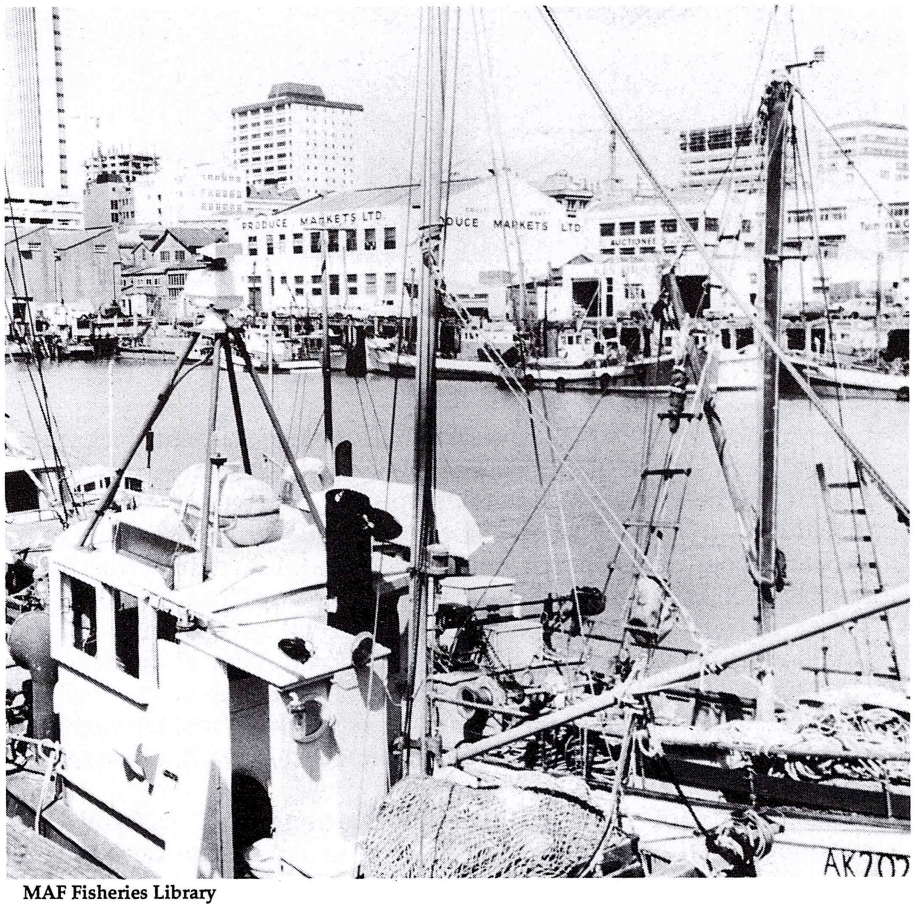
L.J. Paul evidence, Waitangi Tribunal

Marine Fisheries Management in the 1970s [24]

The National Development Conference held in 1968 recognised the potential of the fishing industry and created a ten-year plan that envisaged a substantial increase in export earnings and the development of a New Zealand-based deep-water fishing capacity.

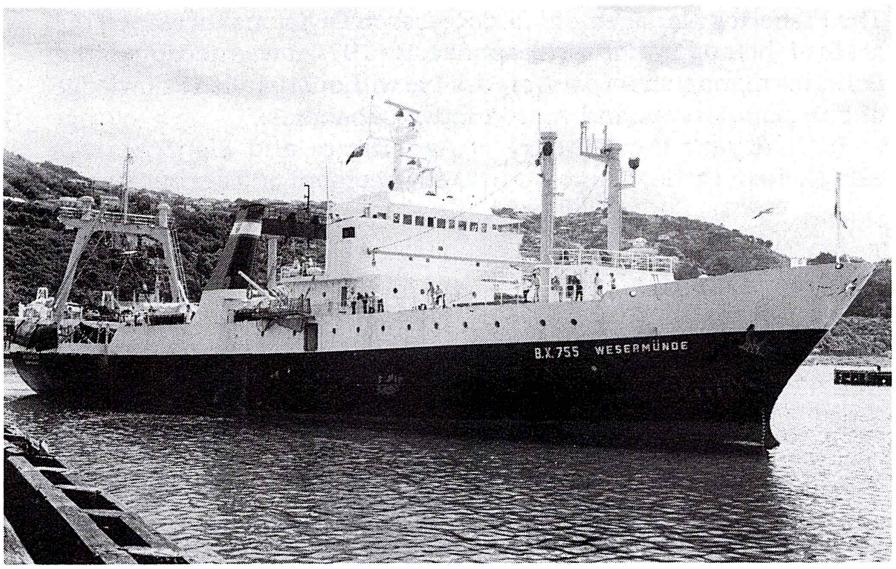
The Fisheries Management and Research Divisions increased the scale of their operations in response. By 1972 it was accepted that fisheries management was impossible without detailed knowledge of fish populations and reproductive capacities.

In that year the Ministry of Agriculture and Fisheries was established. By now there were 30 enforcement officers backed up



MAF Fisheries Library

The New Zealand fishing fleet was characterised by small vessels designed for inshore fishing until the 1980s. The vessels in this photograph of the Auckland waterfront taken in the 1970s are typical.



MAF Fisheries Library

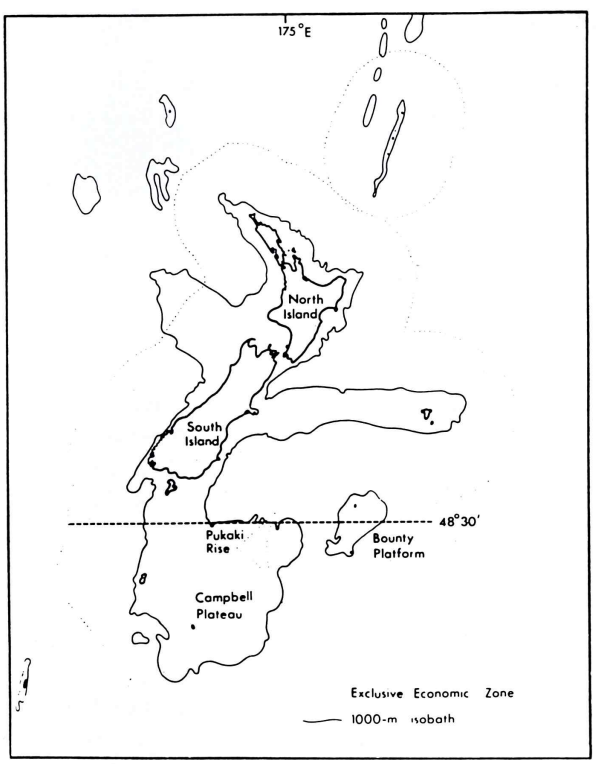
The Wesermünde.

by a growing number of honorary fisheries officers, most of whom policed recreational fisheries and played an educative role. Research on the main commercial species continued, and new research was initiated when a species was recognised as likely to become a commercial proposition. In 1974 a joint venture with an American food processing company was set up. The US superseiner *Paramount* investigated the potential of the migratory skipjack tuna, and subsequently a significant fishery was developed. In the late 1970s a joint German-New Zealand study of the deep-sea fisheries using the trawler *Wesermünde* helped quantify significant fish stocks, most notably orange roughy. This became an important export.

The scale of marine fisheries management expanded enormously when New Zealand declared a 200-nautical-mile Exclusive Economic Zone in April 1978. This was based on the interim conclusions of the United Nations-sponsored International Law of the Sea Conference. The Ministry now had to manage the resources of more than 1.18 million square miles of ocean. Given

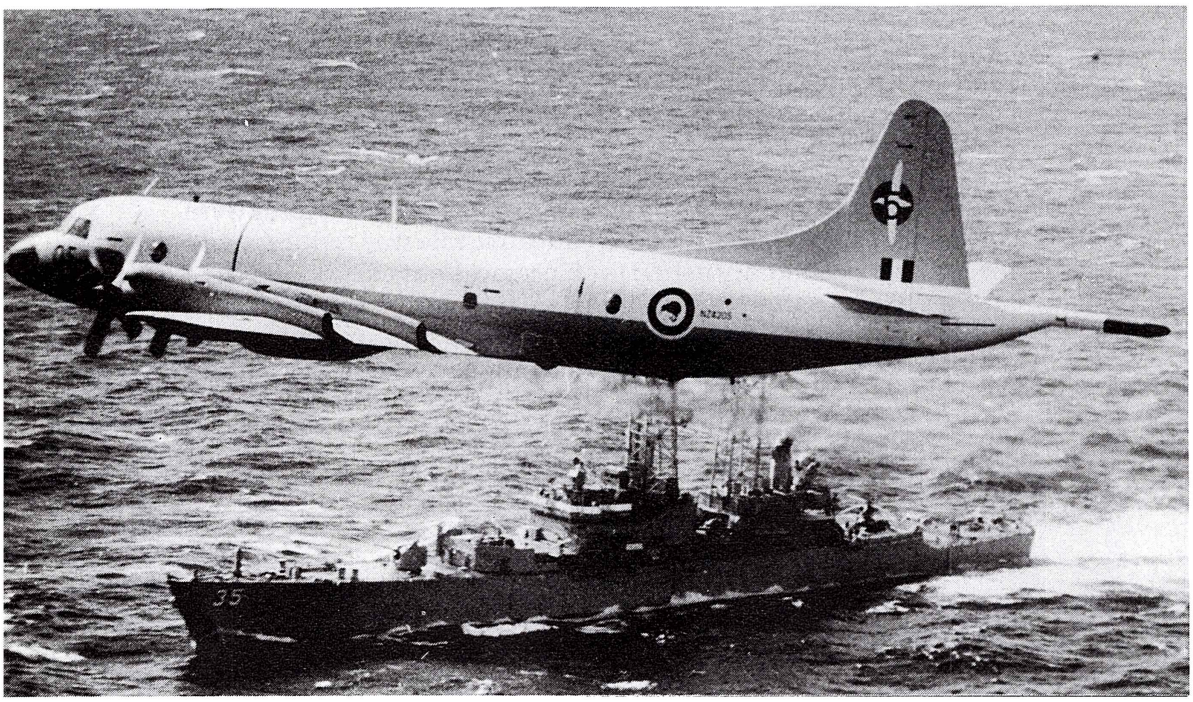
the lack of scientific knowledge about the new zone, MAF adopted a conservative 'safe biological yield' regime.[25] Fishing was limited to those countries which had previously fished within the zone, i.e. Japan, Korea and the Soviet Union. The adoption of the 200-mile zone meant that officers had to monitor the actions not only of New Zealand boats but also of many more foreign vessels. Staff numbers were increased to 85, and the navy and the air force were called in to assist. The Ministry's educative role was reduced, and the number of honorary fisheries officers was cut to 200, who were now given more thorough training.

By the 1970s the 'farming' of marine resources became practicable after research work with mussels, and the Marine



The adoption of an Exclusive Economic Zone in 1978 greatly increased the responsibilities of compliance staff.

Fisheries Library



MAF Fisheries Library

The navy and the air force have been used in fisheries surveillance. Air force Orions are still sent on fisheries patrols.

Farming Act of 1971 made provision for setting up aquaculture. Mussel farming has since developed into a significant export industry, and salmon are also now raised. In 1977 Fisheries Research set up the Mahanga Bay shellfish hatchery in Wellington. Here work was done initially on oysters and rock lobsters, and later on mussels and paua.

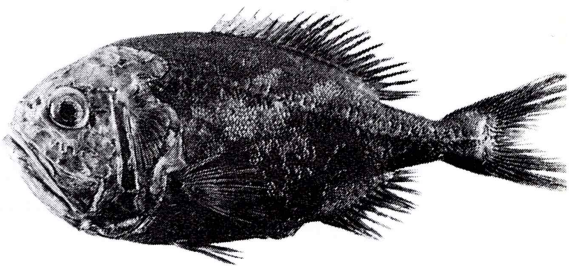
The Quota Management System

Under the Exclusive Economic Zone Act, New Zealand is obliged to allow other nations to fish inside the zone if New Zealanders do not take advantage of the resource. New Zealand at first negotiated quotas annually with those countries using the 200-mile zone.

Initially quotas were a device for raising revenue and fulfilling responsibilities under the Law of the Sea. They also encouraged greater local involvement in the industry. By the early 1980s the nature of fishing in the zone had changed from foreign fishing under licence to joint ventures and vessels working under contract to New Zealand companies. The quota system was adapted and extended. A species quota was set for orange roughy in 1981, and in 1983 a system of individual quotas by weight within a Total Allowable Catch (TAC) was introduced for the seven deep-water species most commonly fished. The Quota Management System (QMS) introduced 18 months later allocated quota in perpetuity and made them fully transferable (i.e. a property right) so that companies could achieve a suitable mix of fish for their processing and marketing needs. This system initially worked well.

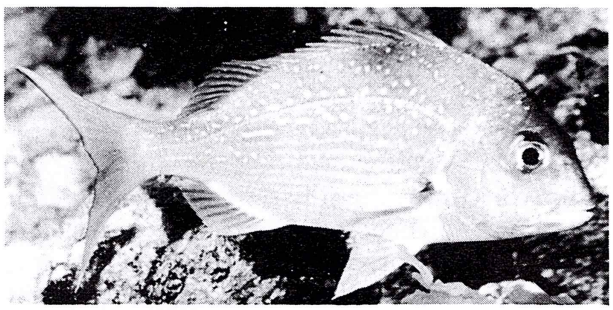
By the early 1980s there were substantial problems with the inshore fishery. Over-fishing had led to the depletion of many

Right *Quotas were first used in 1981, when a species quota was put in place for orange roughy.*



MAF Fisheries Library

Below *Declining snapper catches during the late 1970s led to a recognition that inshore fish numbers were depleted in the early 1980s.*



MAF Fisheries Library

species, notably snapper. As areas were closed, vessels simply moved to other grounds and put extra pressure on those resources. It was clear that there were too many boats chasing fewer and fewer fish.

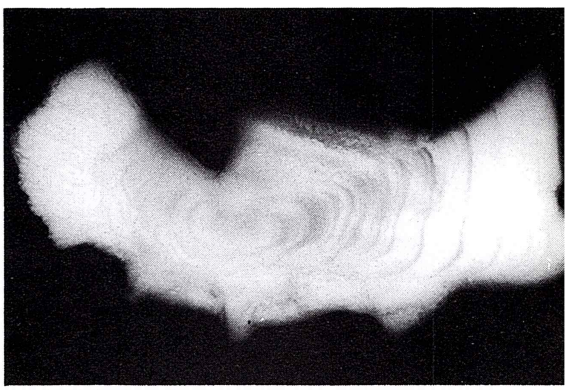
In 1982 the Fisheries Act was amended in order to strengthen the state's ability to manage the resource. Part-time fishers could now be barred from the industry without compensation. Each of seven fisheries regions now had to create fisheries management plans. It was intended that these plans would be formed after considerable public consultation, and it was hoped that management regimes would be sympathetic to local needs and broadly acceptable to commercial and recreational fishers, as well as accommodating the environmental lobby.

While the Act was successful in removing part-timers, the fisheries management plans were never fully developed, because in 1986 the Labour Government extended the quota system to cover some 30 inshore species. Other less commercial species continued to be managed by traditional controls. The allocation of Individual Transferable Quotas (ITQs), which was determined on the short-term (three-year) fishing record of an individual or company, proved a controversial process. Appeals against these allocations continue to the present day.

The introduction of the Quota Management System led to a major change in enforcement away from catching poachers and towards an emphasis on catch monitoring. The Ministry now oversees fish catches and their processing, sale and export in order to trace illegally taken fish. This form of fisheries compliance, as it is now termed, has similarities to Inland Revenue practices in its methods and focus on audit. However, it may be replaced by compliance measures undertaken by quota holders themselves if the philosophy that has led to the QMS is taken further.[26]

The Quota Management System was originally intended to operate according to market forces. Quotas could be traded freely between companies, and an exchange was set up to facilitate this. If researchers found that the total catch for a species or a fishing ground exceeded the estimated sustainable yield, the Government had to buy back quotas to reduce fishing. By 1989 it had become clear that several species were overfished, most seriously orange roughy. The Government was unwilling, however, to spend the millions of dollars that would have been necessary to buy the quotas back. It redefined the ITQ as a

percentage of the total catch rather than a tonnage. The industry challenged the change in court and negotiations ensued that obliged the Government to pay compensation for any reductions in the value of quotas.



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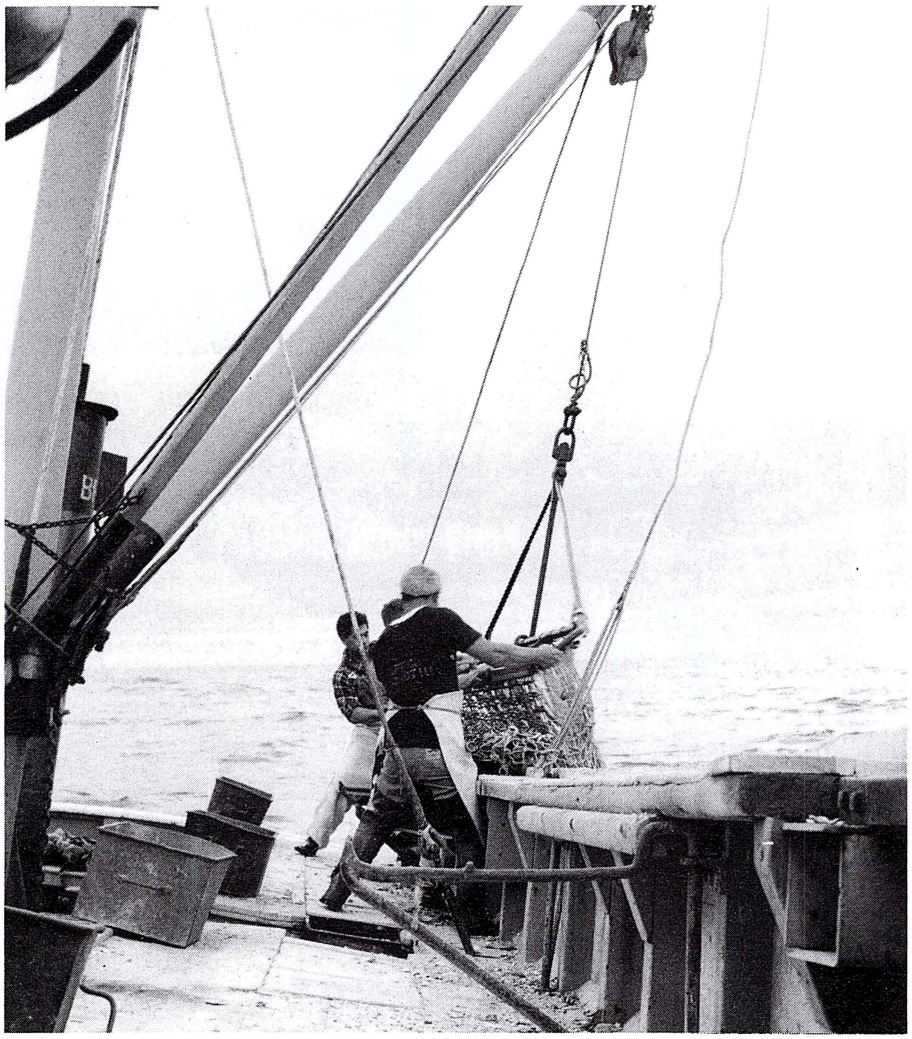
Right *Scientists can now ascertain the age of orange roughy and some other species by counting the rings on the otolith, pictured here. This small piece of tissue is from the ear of the fish.*

Below *Orange roughy is a deep-water fish that was caught in increasing numbers in the 1980s. It proved very difficult to assess fish stocks and hence set an appropriate quota level.*

MAF Fisheries Library

Changes have been made in the legislation to give companies greater flexibility in how they catch their quotas. Quota holders can now overfish or underfish by up to 10 per cent of the quota, and compensate for this in the following season. Initially the quota system encouraged vessels to dump huge quantities of fish

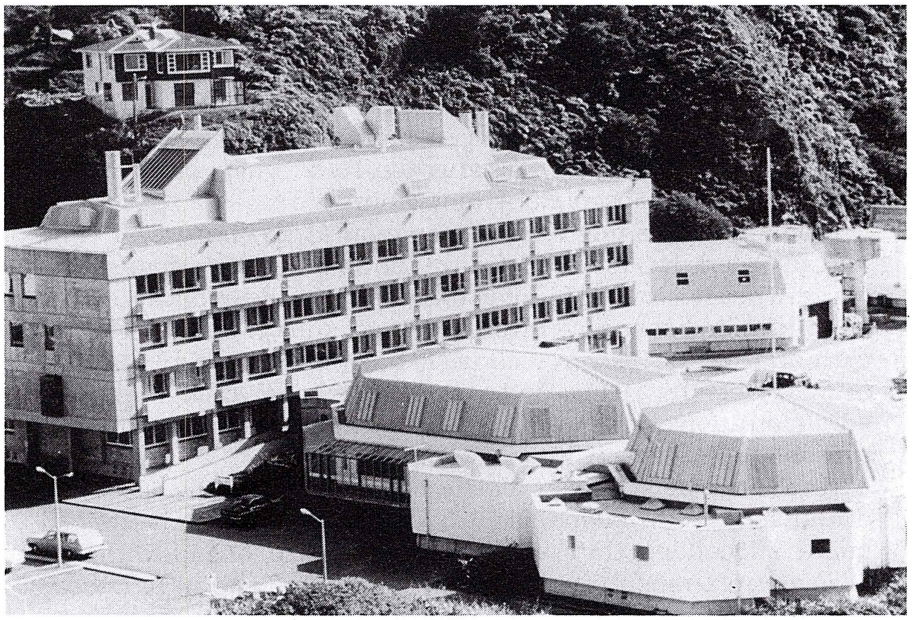


MAF Fisheries Library

Right *Usually the catch is a mixture of fish. Under the quota system this has been a problem, because fishers often do not own quota for the fish they catch. In order to reduce the dumping of fish various schemes have been developed to help fishers trade by-catches.*

MAF Fisheries Library

Opposite *Fishers never know what mix of fish will be caught until the catch is landed on the vessel.*



MAF Fisheries Library

MAF Fisheries head office moved into the Greta Point complex in the early 1980s.

which were caught accidentally (by-catches) or were of poor quality. Such by-catches can now be traded with companies that have quotas for those species.

A Fisheries Taskforce was created in 1991 to investigate the operation of the QMS, and outside consultants were also asked to review developments.[27] The Taskforce recommended, amongst other things, the extension of the quota system to cover all fisheries, the development of associations of quota holders to enforce their property rights, and a reduction in government efforts to ensure compliance. It also recommended that quota holders themselves undertake research. The report has proved highly controversial and has yet to be acted on.

Maori Fisheries

The introduction of the QMS came at the same time as a rise in Maori fishing claims that paralleled similar claims by other indigenous peoples.[28] In 1985 the Labour Government extended the scope of the Waitangi Tribunal so that it could investigate grievances dating from 1840 on. Major claims were made by Northland's Muriwhenua tribes and the South Island's Ngai Tahu. The Muriwhenua claim for most fisheries out to the edge of Northland's continental shelf was largely upheld by the Waitangi Tribunal in 1988, which enhanced the credibility of Maori claims. These claims were further enhanced in 1992, when much of Ngai Tahu's case was accepted by the Tribunal.

Commercial fishing was not common in any particular tribe and, in general, Maori who fished did so on the same terms as non-Maori. The allocation of quotas had considerable implications for Maori claims because it involved a perpetual property right. As early as 1877 the Fish Protection Act had recognised the existence of Maori fishing rights under the Treaty of Waitangi. Yet the administration of legislation had limited rights to non-commercial access to a few specially designated fisheries.

The Muriwhenua tribes took legal action to stop the allocation of quotas. As the system was introduced, two injunctions stopped quota allocations until it was agreed to go ahead with the allocation of temporary quotas while tribal rights were negotiated.[29] Although agreement had still not been reached, the Government, under the 1990 Maori Fisheries Act, established a Maori Fisheries Commission to which 10 per cent of the quota would be entrusted

by 1994. The tribes concerned with this issue, while generally co-operating with the formation of the Fisheries Commission, do not accept that a permanent settlement has been reached.[30]

The second area of concern was the protection of traditional non-commercial fishing rights. These customary rights under the Treaty were recognised in law in *Te Weehi vs The Regional Fisheries Officer* (1986),[31] and are now seen to override all legislation passed since 1840. In 1989 the Fisheries Amendment Act provided for the creation of taiapure, fisheries under local Maori control. Few exist to date but many are proposed.

The Growth of Analysis and Planning

The academic discipline of economics made its entrance to New Zealand with the appointments of J.B. Condliffe as professor at Canterbury in 1920,[32] and of Horace Belshaw at Auckland in 1927.[33] Belshaw's area of interest was agricultural economics, and he, in particular, was consulted by successive governments. The Department of Agriculture employed its first economics graduate, E.J. Fawcett, in 1922. Fawcett's value as a policy adviser was soon seen, and he was stationed in Wellington from the mid-1920s. While policy advice and planning was never formalised into a division, Fawcett and the statistics section, as well as the Fields Division's economists, were often called on to provide such advice. They were in a unique position of influence within head office, and Fawcett's proximity to power certainly helped him become Director-General in 1943.

Fawcett's focus was on farm economics. In the late 1920s he and W.N. Paton, a clerk from the statistics section, developed and standardised the concept of a 'stock unit' in order to analyse pastoral production over time.[34] Different types of production could also be compared. In a 1929 study of dairy farming, Fawcett introduced the concept of assessing production per acre as a measure of efficiency.

The statistics section remained a small unit attached to head office throughout the 1930s, and often worked in close association with the Fields Division.[35] Fawcett's reputation within the Department, and within agriculture generally, had become formidable by the mid-1930s. He made a considerable contribution to the 1934 Royal Commission on Dairying. In 1937 he became Assistant Director-General of Agriculture.

Labour's guaranteed price scheme and more interventionist attitude to the economy led politicians to demand more information on agriculture and how government policies affected the farmer. The number of economists in the Fields Division increased after 1935, but little progress was made in incorporating broad economic research into the Department's activities. Economic analysis had to await the end of the war.

The move towards agricultural planning led to the establishment in 1944 of the Rural Development Division under P.W. Smallfield. The Division 'was established to study farm management and economics, farm engineering, farm forestry, and rural sociology, and to supply statistical, economic, and technical information on primary production'.[36] It also had a brief to monitor international developments in agriculture.[37] The Division's economists were to help the state plan the move from a wartime to a peacetime economy and to service the Agricultural Production Committee of the Organisation for National Development (OND), set up in 1944 and attached to the Prime Minister's Department.[38] This innovation was controversial, and it soon lost favour and was abandoned in 1946.[39] The Rural Development Division produced some important work, including rural surveys and the provision of statistical information to the 1949 Royal Commission on the Sheep Industry.

The winding up of the OND reflected a disenchantment with centralised state planning that in turn undermined the rationale behind the Rural Development Division. The Government now retreated from a broad role in agricultural economics. In 1947 Jim Smith, the Director of the Fields Division, died, and the Division suffered from staff shortages and several short-term directors. The two divisions were merged into an Extension Division under Smallfield in August 1948. This focused on farm advisory work, and most of the general economists became farm economists, with a few economists retained in the statistical section. Extension Division economists became involved in a series of regional agricultural assessments designed to ascertain the efficiency of farming.[40]

Rural Sociology

A by-product of the state's short-lived enthusiasm for economic research was the development of rural social research. Rural sociology had become influential in American agricultural colleges

Turn under the raw edge of reinforcement and stitch down. If the stitching is done by hand, it is an easy matter to remove the lining and put in a fresh one when it becomes worn or stained. Join the sides by run and fell seams. Make small pleats along the front top to fit the front waist. Face back and front with bias strips to form casing at back. Insert elastic from side seams across the back only. This will have two advantages—only a short piece of elastic is needed, and the front is easily identified when the child learns to dress herself.

PATTERNED FROCK

A patterned frock is cut with a front opening and a one-piece collar, the fronts of which are pointed instead of rounded as on the plain frock. A narrow strapping finishes the yoke and is continued to conceal the opening in skirt front. The edges of the strapping, collar, and lower edge of the crossway bindings finishing the sleeves are trimmed with needle point. Directions for working the edging were given on page 445 in the April, 1946, issue of "The Journal of Agriculture."

This frock is simple in style, but the pretty pale-blue lawn with pattern of single white daisies, green leaves, and deeper blue bow-knots, and the dainty edge trimming make it very attractive.

Photographs by Sparrow Industrial Pictures Ltd.

"The Peter Pan in Us."

WE are going to have a big party on Saturday. It is really Robin's birthday (she will be nine) but her brother has just turned seven, so we are having a combined party. It is fun getting things ready and the children have been helping so that they realise it takes some effort to give a party. We made a roll of gay wallpaper into crowns and the kiddies drew and cut out stars for the front of them and they are going to paste some "glitter" on the stars. These will be a change from paper hats. We have thought out all the games and competitions, so as to be original, and my little girl is going to wear her ballet frock (she is in a recital next week) and be a fairy and give each child a small gift.

We don't care a bit if it rains, as we still have a good programme, but of course, if it is fine, the party will be held out of doors. We have a lovely half-acre section with lots of grass and trees, two swings, and a basketball hoop.

I wonder if the children get as much fun out of parties as we grown-ups do. It must be the eternal Peter Pan in us, I suppose.

—"L.K.A.," Auckland.

Housing Survey of Rural Districts

APART from the present urgent need for more houses on farms and in rural areas generally is the long-term problem of providing an adequate standard of housing for every farm family.

Women are most vitally concerned with housing conditions, and from their practical experience they are in a position to make constructive suggestions. Through their organisations they can see that these suggestions are incorporated in future policy. A recent memorandum issued by the Associated Countrywomen of the World (a condensation was printed in the "N.Z. Countrywoman," May, 1946) emphasises this, and outlines some of the ways in which women can work toward better housing in rural areas.

These include studying housing programmes in other countries and making local surveys; working for the enforcement of regulations governing housing conditions and their reform if they handicap the countryside through being drawn up principally for urban conditions; advocating the demolition of the worst types of housing and the building of model homes to exemplify the possibilities of better living and to create a demand for it. The memorandum also says: "We should be prepared to accept new ways of building and living, translated into terms of each country's best tradition and culture. Our homes should not only be comfortable and efficient but should conform to high standards of design. The technical knowledge of landscape planners, architects, etc., is essential for good results. Building for profit, especially speculative building, should be forced to conform to really good standards of comfort, efficiency, and design."

A survey of rural housing is being made at present by the Rural Sociology Section of the Department of Agriculture to obtain accurate information about the age and size of farm houses, the conveniences they possess, and the housing preferences of families on different types of farms. This information is being sought so that more efficient plans can be prepared for farm houses suitable to New Zealand conditions and based on general preferences. The Department of Agriculture proposes to use these plans in a new instructional service, making them available as suggestions to families who are thinking of building new homes or remodelling old ones.

The co-operation of country women in the survey will be very much appreciated. All information is of course confidential. Fill in the application form for a questionnaire below and post it to the Rural Sociologist for your district.

The Rural Sociologists will also answer inquiries from country women about nutrition, preparation and preserving food, and home management generally. Make use of this service.

North Auckland and Auckland:	Rural Sociologist, Department of Agriculture, AUCKLAND.
Taranaki, Wellington, Hawke's Bay, Gisborne, Nelson, and Marlborough:	Rural Sociologist, Department of Agriculture, WELLINGTON.
Canterbury, Westland, Otago, and Southland:	Rural Sociologist, Department of Agriculture, CHRISTCHURCH.

POST THIS TODAY

The Rural Sociologist,
Department of Agriculture,
.....

Please forward me.....copies of the questionnaire on Rural Housing.

Name:.....
(Block letters)

Address:.....
.....
.....

New Zealand Journal of Agriculture, 1946

The housing survey of rural districts initiated by Smallfield and carried out by the home scientists proved a major disappointment. Its very public failure discredited rural sociology before the Department had properly begun to practise it.

and among the social planners of the New Deal. A group of intellectuals in Canterbury lobbied for rural research to guide government policy.[41]

The Labour Government had promised 'efficient' dairy farmers a reasonable standard of living under the guaranteed price scheme.[42] In 1936 the DSIR set up a social research unit to investigate social conditions generally. W.T. Doig, the first member of the unit, began research on dairy farmers. His work provided valuable insights; many dairy farmers lived in some poverty.[43] The Labour Government found the report difficult to accept and tried to suppress it.[44] By the time it was published in 1940, the research unit had been disbanded.

A rural sociology section was established within the Rural Development Division on its formation in 1944; Smallfield saw the potential usefulness of rural sociology and social research. Three highly-qualified home scientists were employed in the section to provide support for rural women and their families, given the links perceived between the rural community, households, children and farm production.

Donald Viggers, a commerce graduate who had been attached to the statistics section prior to the war, joined the new section on his demobilisation and was sent to study rural sociology at the University of Wisconsin.[45] He completed his degree with a dissertation on New Zealand demography in 1947, and returned to take charge of a rural sociology section comprising home science graduates with no training or interest in rural sociology. The section's credibility had been damaged by the failure of a clumsy survey of rural housing, and its emphasis was being shifted in the direction of home science because of political pressure for practical help for rural women brought to bear by the Women's Division of Federated Farmers.[46]

In the 1950s the rural sociology section was renamed the home science section. No further attempts to establish social research were made, and Viggers became simply an office manager. The section prepared exhibits for A&P shows and produced material for the women's pages of the *Journal of Agriculture*, which were very popular and brought in a large advertising revenue.[47]

The home science section became linked with the extension officers in the mid-1960s, following Viggers's retirement. After an unsuccessful attempt to turn it into a home management and budgeting advice organisation, the section was abolished in

1972. By this time its work on recipes, dietetics, and family health seemed to no longer fulfil any great need. Rural women were now much less isolated and their role was changing.

The Economics Division

In the 1950s the Department maintained its policy of maximising agricultural production, particularly by the extension of the grasslands revolution to hill country through aerial topdressing. Export prices were high and marketing remained straightforward.

By the early 1960s confidence in the future of agriculture had begun to ebb. Economists and politicians became aware that, while production was still increasing, it was unlikely to rise rapidly enough to support a continuing increase in the standard of living of a growing population. The typical response of most of those concerned was to look at how agricultural exports could be increased further. This was the primary focus of the Agricultural Development Conference held in late 1963, chaired by the Minister of Agriculture.[48]

The conference recommended the setting up of an Agricultural Production Council, and this was created in 1964. It advocated an overall increase in state assistance to agriculture to overcome small farmers' aversion to risk-taking, which had been identified as a major obstacle to increasing exports. Specific recommendations included taxation concessions, fertiliser subsidies, concessionary lending policies and assistance for farmers on marginal land to increase production. The series of policies that followed represented a new level of government assistance which was to characterise the agricultural policies of both major political parties until the mid-1980s.[49] The scope was widened following the National Development Conference in 1969, which established committees for other industries to set targets for the next decade. The Agricultural Production Council became one of these goal-setting industry committees. It continued in existence for some time before being wound up.

In order to assist this change in policy direction and advise on its implementation, the Department established an Economics Division in 1970 to look at wider issues associated with agricultural economics and rural research. The statistics section became part of the new Division, together with a major group of economists from the Farm Advisory Division. The Economics Division worked

within the long-standing assumption, reinforced by successive governments, that assistance was needed to maximise exports. In 1976 the Government provided extra assistance in the form of a Livestock Incentive Scheme, and in 1978 it introduced Land Development Encouragement Loans for marginal land in an attempt to arrest a decline in stock numbers.[50]

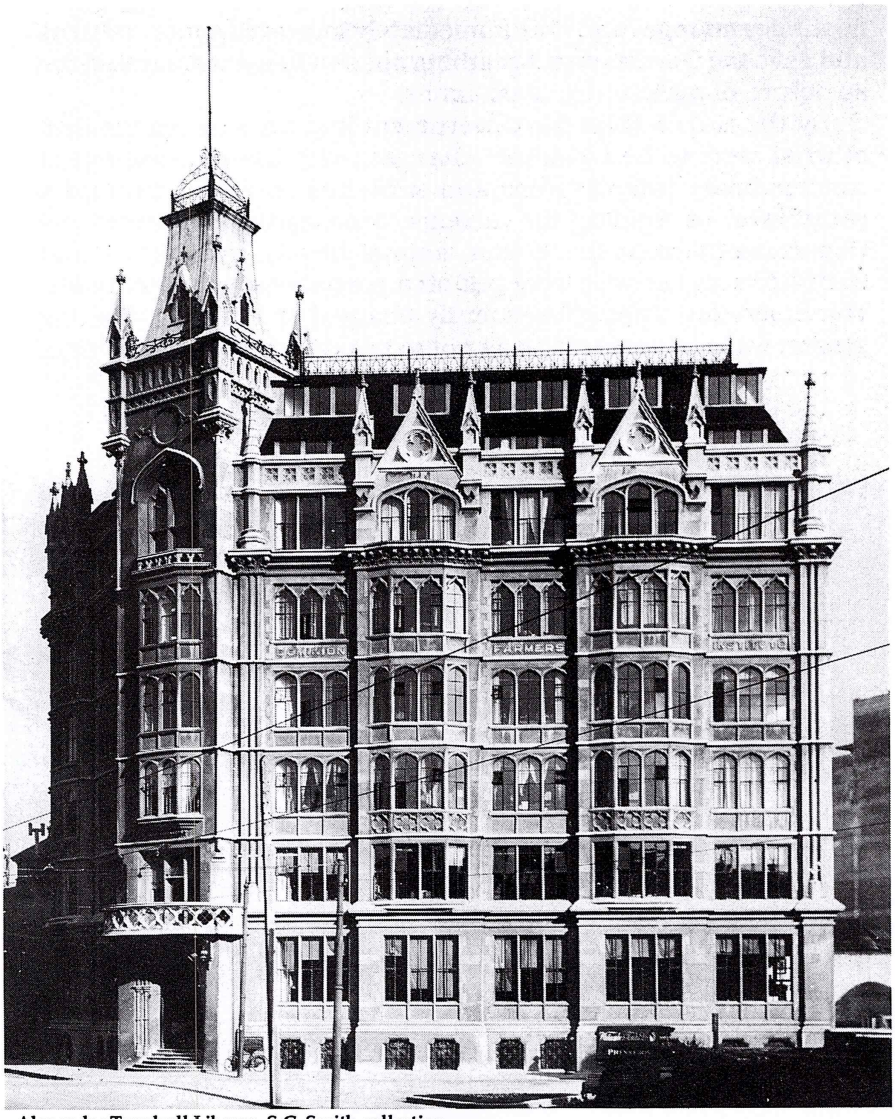
The Division developed considerable expertise in the cost-benefit analysis of irrigation schemes, but it soon became apparent that the Ministry needed other skills to assess both specific projects and more general macro-economic and socio-economic policies. A wider range of experts was employed to address this problem.

Farming had always been hindered by the increased costs resulting from import licensing and tariffs, and by protectionist policies overseas. The maintenance of a high exchange rate further depressed returns. To assist farmers and maintain levels of production, the Muldoon Government introduced a system of 'supplementary minimum prices' (SMPs) in 1978. These ensured returns above the guaranteed minimum price at a time of low overseas prices.[51] As agricultural commodity prices fell in the late 1970s and early 1980s, the costs of the scheme mounted and it became a considerable burden.[52]

By the late 1970s there was an increasing divergence between the traditional agricultural economists, who believed in maintaining investment in farming, and those who asserted that agriculture was being artificially sustained by Government and that market forces should be felt more strongly. The former hoped that the decline in agricultural prices would be reversed, while the latter suggested that it was part of a long-term trend. Treasury was acutely aware that the increasing costs of SMPs could not be sustained without serious economic consequences. In 1984, National announced that the scheme was to end. By the time this was done the fourth Labour Government had been elected.

Economic Policy Since 1984

Labour's victory marked the cessation of significant financial support to agriculture and led to the opening up of the economy to market forces. The first step with a major impact on farmers was

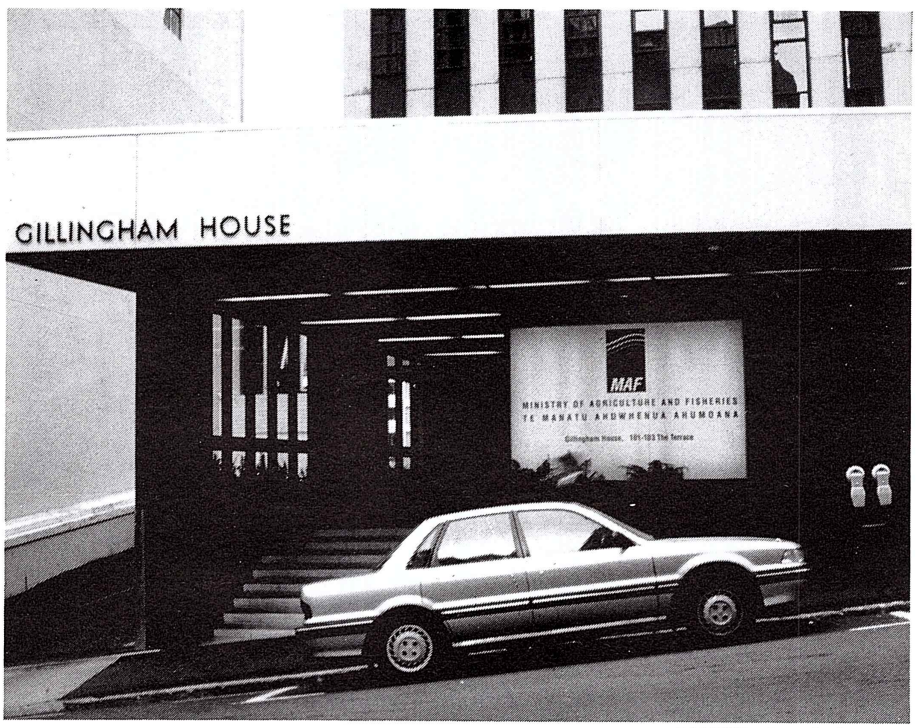


Alexander Turnbull Library, S.C. Smith collection

The head office of the Department and then the Ministry was in the Dominion Farmers Building from 1913 until the early 1980s.

the devaluing of the dollar and the move from a managed to a floating exchange rate. This immediately improved export returns and gave the Government breathing space while it dismantled the structure of agricultural assistance.

By the end of 1984 the Government had announced the first of what were to be wholesale changes, with the phasing out of concessionary interest rates and subsidies on fertilisers, and a withdrawal of funding for noxious weed control. In 1986 the Department's meat inspection, animal health, quarantine and farm advisory services were put on a partial cost-recovery basis. These services were subsequently charged at full cost. The tax system was restructured so as not to favour any specific sector of



MAF/Words and Pictures

Since the early 1980s the head office of the Ministry has been located in Gillingham House on the Terrace.

the economy; farm development expenditure deductions and the concessionary livestock valuation system were phased out. Industry reserve accounts and Rural Bank lending were restructured; debt was written off and the bank itself was eventually sold to Fletcher Challenge.[53] The pain experienced by rural industries from the withdrawal of assistance and low international commodity prices was to be exacerbated by an increase in the value of the dollar for much of the rest of the 1980s.

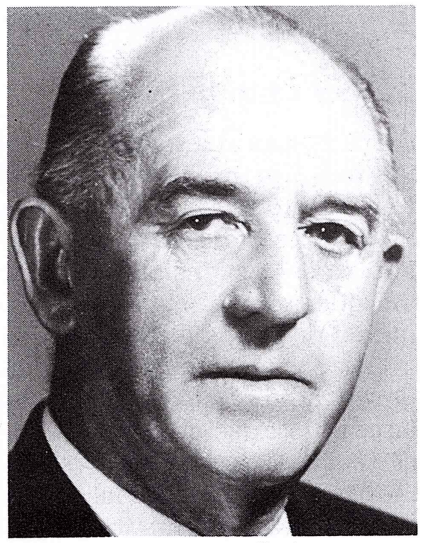
By 1990 agriculture was effectively being taxed to support the remainder of the economy, because assistance to the sector had been almost wholly removed while some of the tariff structure responsible for the high cost of imported goods remained intact. A policy of minimal government intervention and general fiscal restraint after 1984 had led to a reduction of the remaining supports for agriculture, including those supplied by the Ministry such as extension, research and development, state veterinary services, and quality control.

Biography

E.J. Fawcett

Ernest James Fawcett was born at Tadmor, near Nelson, in 1892. After joining the public service, he volunteered for military service in 1915 and lost an arm at Passchendaele. He was awarded the Military Cross and discharged as a captain in 1918 to undertake an economics and agricultural science degree at Cambridge under the Government's rehabilitation scheme. He gained a Kitchener Scholarship and graduated in 1921.

Fawcett returned to New Zealand, and was employed



National Archives, MAF collection

E.J. Fawcett.

by the Department of Agriculture as an assistant instructor with the Fields Division in 1922. His early work included a study on the economics of six-horse plough teams on arable farms, and surveys of dairy and poultry farming. In 1925 he was transferred to head office, and in the same year gained a Masters degree in economics from Cambridge. He was prominent in standardising agricultural statistics in the late 1920s, and was one of the co-ordinators of a major survey of New Zealand agriculture. He contributed three chapters to the resulting book, *Agricultural Organization in New Zealand*, which is still the outstanding reference work on New Zealand agriculture before the Second World War.

In 1937 he was appointed Assistant Director-General, and played a pivotal role in establishing animal research within the Department. In 1943 he became Director-General, and was Primary Industries Controller for the rest of the war. He established the Rural Development Division in 1944. He had represented the Government at the 1943 Hot Springs Conference in the United States, which led to the establishment of the Food and Agriculture Organisation (FAO) in 1945.

Fawcett contributed much to the FAO and became increasingly interested in international trade, participating in New Zealand's negotiations with Britain over exports. Fawcett was awarded the CBE in 1951 and made a life member of the Royal Agricultural Society in 1958. He retired in 1957 and died in 1962.[54]

Recent Changes

Farming was at a turning point in the late 1970s. As real returns for pastoral products declined, farmers became increasingly reluctant to spend money on expanding output. Even with greater levels of state assistance, production began to decline. The Ministry's responsibility for maximising production now came into question, although the supplementary minimum price scheme muted demands for change by inflating pastoral returns.

The Ministry began to search for a new role in the late 1970s. Throughout its history it had been seen as the 'farmers' friend', largely because of its focus on maximising production and the close links between the Advisory Division and farmers. The industry-based divisional structure encouraged farmers to believe that the Ministry was their advocate. While the Ministry adapted

its advisory services to assist new primary industries such as kiwifruit, there was unease from within at its orientation and direction.

The divisional structure of the Ministry was gradually de-emphasised, with more of a focus on general functions, which were identified as increasing productivity, protection, quality assurance and policy advice.[55] The Ministry was also increasingly concerned at rising expenditure, particularly on research, at a time when returns to farmers were falling.

The change of Government in 1984 and the removal of agricultural subsidies helped to redefine the role of the Ministry. The new macro-economic focus changed basic assumptions. Development capital and expertise were to be allowed to flow to the areas in which they would be most productive, whether that was exporting, import substitution industries or domestic production.[56] The over-production of sheepmeat as a result of SMPs had led to a realisation that in the future MAF would have to identify those areas in which its efforts would be most profitable, rather than rely on traditional areas of expertise. The Ministry's close association with farmers and emphasis on production were reduced, and replaced by a focus on policy advice based on sound economic and social research.[57]

The divisional structure was seen as a hindrance to change. Major scientific and quality management issues affected a wide range of farming activities rather than those covered by one division, while a greater concern for the environment demanded a more general response than any division or grouping of divisions was capable of. If MAF was to charge for its services it made sense to link together similar services to maximise efficiency. Thus in 1988 the Ministry was restructured into four businesses with distinct functions. MAFQual, which was responsible for quality management, inherited many of the functions of the Meat, Dairy and Animal Health Divisions together with those of the Animal Quarantine Service. MAFTech became responsible for research and technology transfer, while MAFFish retained responsibility for fisheries, although the formal distinction between research and management was removed. MAFCorp was set up as the Ministry's administrative arm. The aim was to increase efficiency of outputs in line with the Labour Government's approach to the

public service. The major change for MAF's clients was that services which had been supplied without charge were now sold. The logic was twofold. Government revenue was increased and MAF was forced to target and refine its product so that it was what the client wanted. It became more common for the Ministry to be involved in joint ventures led by industry, and less common for MAF to prescribe solutions.

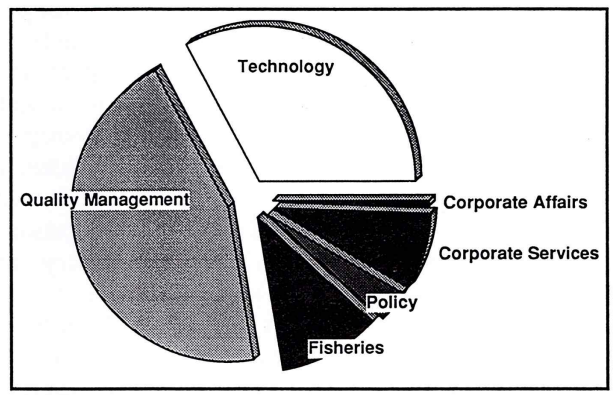
MAFTech operated on a partial cost-recovery basis,[58] and once it began charging for its services, demand altered and its advisory function diminished. MAFTech scientists were obliged to spend time seeking funding. The private sector proved unwilling to provide the level of support that the Government had maintained, and the quantity of agricultural research declined.[59]

In July 1990 policy advice was separated from business functions. MAFPolicy combined the expertise of scientists, economists, veterinarians, quality specialist risk analysts and advisory staff to monitor the state of and prospects for agriculture and advise the Government on standards for security and quality management.

In July 1992 a further restructuring was undertaken. The research functions and research stations of both MAF and the DSIR were transferred to independent Crown Research Institutes which compete with private bodies for both private and public funds. Research is now 'contestable' in the sense that a market exists in which several organisations bid to undertake research. Public funds are disbursed by the Foundation for Research, Science and Technology, which decides on the most appropriate allocation.

The Ministry has thus severed its direct scientific involvement with agriculture, and properties such as Ruakura, Wallaceville, Lincoln and Invermay have passed into the control of the Crown Research Institutes (CRIs). What remained of the previous farm advisory service was to have become a state-owned enterprise but will now remain part of MAF as a stand-alone function. While MAF no longer has any direct involvement in research, close links will be maintained with the CRIs and with farming groups. MAF is still the only governmental organisation with a network of officers working in close contact with farmers.

MAF itself was in 1992 restructured again into six groups covering policy, regulatory authority, quality management,



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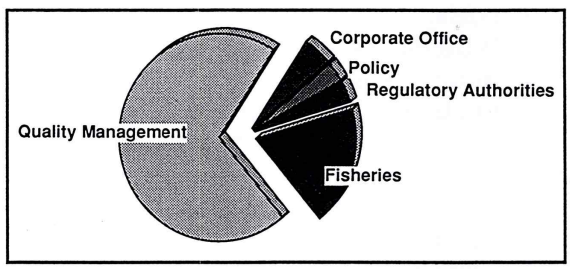
MAF's staff declined from 4,166 in June 1991 ***[right]*** *to 2,430 with the relocation of scientists into Crown Research Institutes* ***[below]****.*



MAF

fisheries, 'Agriculture New Zealand' (the farm advisers), and the corporate office. The Policy Group has four areas of focus: external policy, concerned with international developments such as agricultural trade liberalisation under the current GATT round; domestic policy, for example policy research, including the development and passage of legislation; the Rural Research Unit, which provides policy information advice on factors affecting rural communities; and fisheries policy, with a focus on resource management.

The Regulatory Authority Group sets quality and hygiene regulations for quarantine, as well as for imports and exports. It has animal, meat, plant and dairy sections. Much of the group's work involves consultation with officials in other countries and with various industries in New Zealand. The Quality Management Group undertakes agricultural security (quarantine and border

protection) services, and meat inspection. Its work is governed by regulations administered by the Regulatory Authority Group. The Fisheries Management Group remains largely unchanged for the time being; MAF continues to be active in fisheries research and management. A smaller fifth group, the Corporate Office, provides specialist administrative services, for example, lawyers, to the four other businesses and advice to the Directorate-General.

High on MAF's current agenda is the facilitation of world agricultural trade. The Ministry, with the Ministry of External Relations and Trade, is closely involved in efforts to reduce trade barriers as part of the GATT negotiations. Regulatory officials are working to reduce sanitary and phyto/sanitary restrictions on the trade of food. They now spend much of their time in other countries explaining New Zealand's requirements for imports and the high standards of our exports.

The legislation under which the Ministry operates is currently under review, and many Acts are likely to be consolidated. A Biosecurity Bill being drafted is intended to consolidate powers within the various Acts administered by MAF concerning administrative mechanisms for managing weeds, pests and diseases. Central Government will retain responsibility for controlling pests of national importance, and quarantine.[60] Most pests will remain the responsibility of the landholder.

A proposed Agricultural Compounds Bill is intended to provide greater responsiveness to changes in technology and market conditions. Legislation covering quality management will also be consolidated in a single Act. A Primary Products Bill is being drafted to supersede provisions in the various Acts concerned with export standards, quality control and the hygiene of all agricultural products.

Conclusion

The New Zealand state has had a close association with the development of farming since the mid-nineteenth century, and from 1892 the Department of Agriculture has played a central role. Government controls provided some security for farmers. Quarantine and animal health services were introduced to contain disease, and legislation for the control of various pests was passed.

From the 1880s the Government began to assist infant rural industries. The Department of Agriculture further developed this role, and was in part responsible for the growth of dairying and pip-fruit orcharding into successful export industries.

Refrigeration made meat and dairy exports viable, and new farming practices and technologies increased production dramatically. The Department was at the centre of these developments. Systematic research and extension activities came to dominate its role from the late 1920s.

The Department was extremely successful in increasing pastoral production, thanks largely to the grasslands revolution. This emphasis brought spectacular increases in output until the mid-1960s, but also led to a limited consideration of environmental factors such as water and soil conservation. The Ministry has been forced to restructure in response to recent changes in the relationship between the Government and the economy. Maximising pastoral production is no longer a function of the Ministry, which now has a broader brief to monitor and advise on sustainable agricultural productivity.

The realignment of macro-economic policy after 1984 has led to a decline in the farm advisory services, and research has been relocated within commercially-driven Crown Research Institutes. However, MAF's functions remain considerable. They include policy, regulation, delivery of services (for example, agricultural security and meat inspection), and fisheries management and research. Moreover, there is a new sense of direction and a belief within the organisation that services are now more strongly targeted and responsive to their clients' needs.

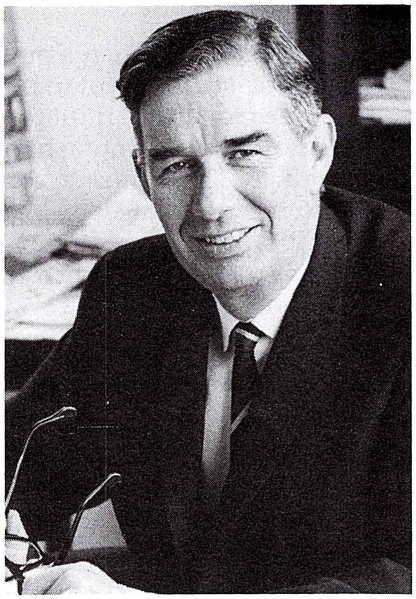
Over a century the Department of Agriculture and its successor, the Ministry of Agriculture and Fisheries, has fostered the development of New Zealand's primary industries, prevented or controlled outbreaks of disease, undertaken vital research, and ensured the high quality of our agricultural exports. It has done this in the context of an economy which has been crucially dependent for its health on the continued vitality of its primary industries.

New Zealand needs healthy and viable agricultural and fishing industries. It will remain MAF's role, as it has been for 100 years, to help New Zealand's primary industries prosper.

Biographies

Alan Johns

Alan Johns was born at Amberley, North Canterbury, in 1917. He was educated at Canterbury University College and gained a PhD from Cambridge. His study was interrupted by war service with the 2nd NZEF. He joined the DSIR in 1949 and was appointed Director of the Plant Chemistry Division in 1956. In 1966 he was appointed Assistant Director-General, and two years later he became Director-General. His appointment reflected the Department's greater emphasis on sophisticated scientific research, and his time as Director-General was characterised by considerable growth in this area.



A. Johns

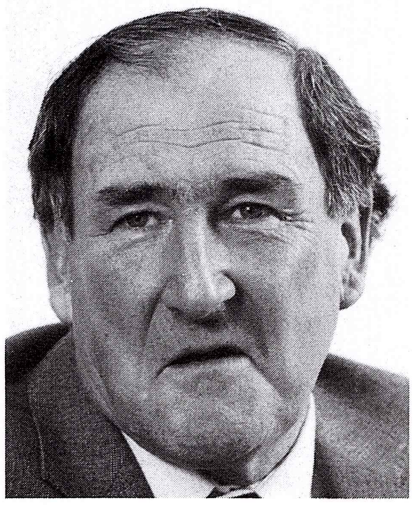
Alan Johns.

Alan Johns co-ordinated the merger of fisheries with the Department of Agriculture in 1972 and was the first Director-General of Agriculture and Fisheries. He has been chairman of the University Grants Committee, Pro Chancellor of Massey University and the first chairman of the FAO/WHO Codex Committee on Meat Hygiene, and a member of the New Zealand Wool Board, the National Research Advisory Council, the Massey University Council and the Council of the Food and Agriculture Organisation in Rome. He was made a CBE on his retirement.[61]

M.L. Cameron

Malcom Leitch Cameron was born at Timaru in 1929. He attended Canterbury University College and Lincoln College, graduating with a B.Agr.Sc. in 1951. He was a farm advisory officer in Timaru from 1951 to 1964, when he became manager for the Northland Region, based in Auckland. He was promoted to Assistant Director of the Farm Advisory Division in 1968 and Director in 1969.

He became Assistant Director-General of Agriculture and Fisheries in 1974 and Director-General in 1977. During his term fisheries management became a major part of the Ministry's activities. He was responsible for the Ministry's restructuring after 1984, which included the adoption of charging for services and eventually the reorganisation into four core businesses. He retired in 1989 and was made a CMG. He has been a member of the council of the Food and Agriculture Organisation, the Lincoln University Council and the Fishing Industry Board. He has also been a Director of the New Zealand Wool Board. In 1983 he was awarded the Bledisloe Medal for services to agriculture.[62]



MAF

M.L. Cameron.

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[17] P.R. Stephens, 'The Department of Agriculture', *NZJA*, vol 85, p.375. P.W. Smallfield, *The Grasslands Revolution*. *AJHR*, 1916, H-29, p.5.

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[22] *Annual Report*, 1913, p.38.

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[26] Jimmy M. Skaggs, *Prime Cut: Livestock Raising and Meatpacking in the United States, 1607-1983* (College Station, Texas, c.1986), pp.83-4. Despite this early adoption of meat inspection to facilitate trade, the domestic US meat industry was characterised by low standards. The United States Department of Agriculture set guidelines under the Food and Drug Act of 1906, which also banned the interstate trading of adulterated or mislabelled food. States had varying meat inspection rules, and producers were not forced to adopt USDA guidelines until the 1967 Wholesale Meat Act (Skaggs, pp.209-10).

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2 Hawke, *The Making of New Zealand*, p.163.
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9 ibid, p.35.
10 ibid, p.40. See also Russell Reynolds and S. SriRamaratnam, 'How Farmers Responded', pp.157-61, *Farming Without Subsidies*.
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18 E.R. Martin, *Marine Department Centennial History 1866-1966* (Wellington, 1969), p.113.
19 *Report of the Waitangi Tribunal on the Muriwhenua Fishing Claim* (Wellington, 1988), pp.77-119.
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38 Baker, *War Economy*, pp.527-31.

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40 *AJHR*, 1950, H-29, p.8. This research was carried out in response to requests by Federated Farmers. For an overview, see *NZJA*, vol 101 (1960), pp.83-4.

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48 *The Agricultural Development Conference 1963-64* (Wellington, 1966), p.5.
49 Laurence Tyler and Ralph Lattimore, 'Assistance to Agriculture', *Farming Without Subsidies*, pp.60-79.
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Appendices

Appendix A

Ministers of Agriculture and Fisheries

Ministers of Agriculture

G.F. Richardson	1889-1891
J. McKenzie	1891-1900
T.Y. Duncan	1900-1906
R. McNab	1906-1908
J.G. Ward	1908-1909
T. Mackenzie	1909-1912
W.F. Massey	1912-1915
W.D.S. Macdonald	1915-1919
W. Nosworthy	1919-1926
O.J. Hawken	1926-1928
G.W. Forbes	1928-1930
A.J. Murdoch	1930-1931
D. Jones	1931-1932
C.E.B. Macmillan	1932-1935
W. Lee Martin	1935-1941
J.G. Barclay	1941-1943
B. Roberts	1943-1946
E.L. Cullen	1946-1949
K.J. Holyoake	1949-1957
S.W. Smith	1957
C.F. Skinner	1957-1960
W.H. Gillespie	1960-1961
T.L. Hayman	1961-1962
B.E. Talboys	1962-1969
D.J. Carter	1969-1972

Ministers of Agriculture and Fisheries

D.J. Carter	1972
C.J. Moyle	1972-1975
D. MacIntyre	1975-1977

Minister of Agriculture

D. MacIntyre	1977-1978

Minister of Fisheries

J.B. Bolger	1977-1978

Ministers of Agriculture and Fisheries

D. MacIntyre	1978-1984
C.J. Moyle	1984-1989

Ministers of Agriculture

J.R. Sutton	1989-1990
J.H. Falloon	1990-

Ministers of Fisheries

K.L. Shirley	1989-1990
D.L. Kidd	1990-

Appendix B

Chief Executives of the Department of Agriculture and the Ministry of Agriculture and Fisheries

Secretaries of Agriculture		*Background*
J.D. Ritchie	1892-1909	Farm Manager
F.S. Pope	1909-1918	Administrator

Directors-General of Agriculture		
C.J. Reakes	1918-1936	Veterinarian
A.H. Cockayne	1936-1943	Grasslands Scientist/ Fields Division
E.J. Fawcett	1943-1957	Economist/Fields Division
R.B. Tennent	1957-1958	Agricultural Scientist/ Extension Division
P.W. Smallfield	1958-1962	Agricultural Scientist/ Extension Division
D.N.R. Webb	1962-1968	Administrator/Director-General Lands and Survey
A.T. Johns	1968-1972	Scientist/DSIR

Directors-General of Agriculture and Fisheries		
A.T. Johns	1972-1977	Scientist/DSIR
M.L. Cameron	1977-1988	Agricultural Scientist/ Advisory Division
R.E.W. Elliott (acting)	1988-1989	Veterinarian
R. Ballard	1990-	Scientist/Manager (Forestry)

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1. Page numbers in italics denote illustrations.
2. Page numbers in bold refer to biographies.
3. 'Divisions' or 'sections' lacking further identification are components of the Department of Agriculture and/or the Ministry of Agriculture and Fisheries.

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This book traces the policies and scientific developments that have shaped New Zealand farming over the past 100 years. It describes the establishment of the Department of Agriculture and its traditional role as farmers' advocate. This Department became the Ministry of Agriculture, which, in turn, became the present-day MAF with the addition of the fishing industry.

All the major events in New Zealand farming are described, from scab and the rabbit plague a century ago, to the grasslands revolution, the campaign against 'bush sickness', the impact on farming of World War II and the unique relationship of New Zealand with the United Kingdom after the war in the boom period for the industry.

White Collars and Gumboots tells the fascinating story of the growth of a nation's natural resources.

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